

GENERAL AND SOCIAL PSYCHOLOGY

A TEXTBOOK FOR STUDENTS
OF PSYCHOLOGY AND OF
THE SOCIAL SCIENCES

BY

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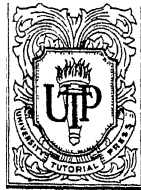
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PREFACE TO THE THIRD EDITION

IN its early days this well-known book was published as *Social Psychology*, but in the Second Edition it was revised and extended to cover General Psychology as well. This new Third Edition sees it drastically revised, to take account of new developments in Psychology and new directions of interest. The type has been entirely reset and a modern format adopted.

Much of the earlier part of the book has been completely rewritten, and a new chapter has been added on the nervous system. The chapters on Statistical Methods have been extended to make them a practical introduction to the main methods which the student of Psychology needs. Multiple-Factor Analysis receives fuller treatment, and an elementary account has been included of the increasingly important method of Analysis of Variance. The chapters on Mental Tests, and on Morality and Crime have been brought up to date, and the sections on Laughter (Chapter XI) and Aesthetics (Chapter XXIV) have been rewritten.

In view of the increasing use of the work as a standard text in universities and colleges at home and abroad for students of Psychology, the present revision has been undertaken with the needs of such students in mind, and it is hoped that in its present form they will continue to find it of value.

The author is grateful to Mr O. L. Zangwill for his kindness in reading and criticising Chapter VI, and to Professor Sir Cyril Burt for the trouble he has taken in answering questions bearing on the results of Multiple-Factor Analysis.

R. H. T.

Cambridge.

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GENERAL AND SOCIAL PSYCHOLOGY

CHAPTER I

THE SCIENCE OF PSYCHOLOGY

1. What is Psychology ?

The aim of psychology is to obtain rules by which we may be able to understand and predict the behaviour and thought of human beings, as in physics our aim is to find rules enabling us to understand and predict what happens in a physical system under various physical conditions. If we agree that the basic method of obtaining this understanding in psychology is to be of the same kind as that of such sciences as physics and physiology (that is, experiment and observation), we are led to a psychology which is *empirical* or *scientific*. Such a psychology may be defined as *the positive science of human experience and behaviour*. By calling it a science, we indicate that its concern is the systematisation of facts gathered by the methods of observation and experiment. It is a positive science (as opposed to a normative study like ethics) because its concern is with facts as they are, and not as they should be. The terms "behaviour" and "experience" indicate two complementary ranges of data with which we are concerned. In the presence of any situation affecting a human being there are two points of view from which we may study what happens to him, that of an outside observer and that of the individual himself. The outside observer may see that the lover blushes at the mention of the name of his beloved, shows restlessness and distraction in her absence, and carries out persistent behaviour to bring himself into and to continue in her presence. The feelings that the lover experiences and the words and images which occupy his thought are observable to no one but himself. The psychologist is concerned with both aspects of human activity—behaviour and experience. Both must be studied if we are to gain understanding of human thought and activity.

In some fields of psychological investigation—in animal psychology, for example, and in part of child psychology—we are necessarily limited to the study of behaviour since we cannot

question our subjects as to their experiences. In this field, therefore, we are cut off from the study of part of the subject matter of psychology, but we have the compensating advantage that our observations are more like those in the other sciences since behaviour data are more reliable than accounts of experience, less likely to be distorted by peculiarities of the subject tested, and less likely to be influenced by the preconceived ideas of the experimenter. They come nearer, therefore, to the ideal objectivity of scientific experiment as it is found in a physical experiment where the same experimental conditions reproduced by another investigator will inevitably lead to the same experimental result.

For this reason, experiments of this, the *behaviouristic*, type are to be preferred in psychology when they are available to us. If we want to discover whether a given individual is colour blind, we should not proceed by asking him what colours looked like to him, but by giving him some task of discriminating colours which the normally sighted person could perform. At the same time, we shall not refrain from asking him any questions about the appearances of colours if we think the answers will help us to understand his difficulty in colour discrimination. There have been schools of extreme *behaviourism* which forbade us to do even this and which admitted only the observable movements and other behaviour responses of a subject as the proper objects of psychological study.

The development of behaviouristic methods of experiment and observation has been of great advantage to the growth of psychology. Animal and child psychology have benefited by the development of a technique of enquiry in which behaviour itself has been studied and systematised instead of being used as an uncertain foundation for a system of speculations about what was passing through the mind of the animal or child studied. In adult human psychology, too, the more objective methods of study are to be preferred whenever they will give the information we require.

Unfortunately, they do not always do this. The danger of behaviourism, particularly in its more extreme forms, has been its tendency to lead to neglect of some aspects of human response which are vital to understanding. If we study the remembering powers of an animal, we cannot question the animal as to its mental processes, although perhaps we should understand its performances better if we could. If, on the other hand, we are studying the remembering powers of a human being, it is absurd to cut ourselves off from this source of information. Let us suppose that we give a subject a series of nonsense diagrams to look at for a

certain time and afterwards reproduce. We assess his power of remembering by measuring the correctness of the reproductions. That is a purely behaviourist experiment and it may lead to useful results. But differences between different individuals may be due to factors which such an experiment does not reveal. On questioning them we may find that one subject reports that he is remembering the diagrams by calling up mental pictures of them, another by thinking of them as resembling various objects, another by noticing their resemblance to the symbols in some system of shorthand, and so on. It is not reasonable to cut ourselves off from this source of information altogether, however much we may recognise the greater reliability of observations of behaviour.

It is sometimes supposed that psychology is making statements about states of consciousness when in fact it is doing nothing of the kind. It is said, for example, that we know our own conscious state of being angry or being interested, and that when we speak of an animal as being angry or being interested we are making an illegitimate speculation as to the state of its consciousness, and that we should only talk of angry behaviour or investigatory behaviour when talking of animals. If this argument were true, we should be restricted to making reports about ourselves alone when talking of anger and being interested; we can no more experience the states of consciousness of another person than we can of an animal. It is true that another person may say "I am angry" whereas an animal cannot, but this does not enable me to experience his state of consciousness, it is only an additional piece of behaviour (verbal behaviour) from which I can deduce whether he is angry.

But is it necessary to suppose that when I say "I am angry" I am making a report about my own state of consciousness? The use of the word "anger" is to describe a condition we may observe in ourselves or in other people or in animals. The meaning of a word is the way it is used, and "angry" is certainly not only used of ourselves. If we imagine an individual of such saintliness that he had never experienced anger, he would still use the word with exactly the same meaning as everyone else; if I said "X is angry" he might agree "Yes, X is angry". He is not speculating about X's state of consciousness, but also neither am I. We are both describing an observable characteristic of his behaviour. And when I say "I am angry" I am using the word with the same meaning. It is true that I may use a different criterion for determining whether I am angry from that used for another person, since I am likely to rely on my own self-observation of my state of consciousness rather than on observation of my behaviour. The

use of a different criterion, however, does not imply a different meaning of the word. One man may say that it is a hot day because he has looked at the thermometer and found it high, another may say that it is hot because he himself feels hot, but both attach the same meaning to the word "hot".

I can, of course, also talk about my own state of consciousness and this would generally be indicated in ordinary speech by a change of language. I might say "I feel angry" when I wanted to be understood to be talking about my state of consciousness. Neither in ordinary speech nor in psychology should we use such a phrase about another person or about an animal. It is with such propositions as "X is angry", not with such propositions as "X feels angry", that psychology is primarily concerned. To deny the legitimacy of their use in connection with other people or with animals because they are supposed to imply speculations about their states of consciousness, is an error based on a misunderstanding of the meaning of such phrases.

Does the psychologist, then, deny the existence of states of consciousness in animals? No more than he denies the existence of states of consciousness in other people. I know that X is sometimes angry and I know that my dog is sometimes angry. Whether either or both of them have the same sort of conscious experience as I have when I feel angry is a question about a proposition which is not capable of verification. It is a proposition that it would be senseless either to assert or to deny. With such propositions, scientific psychology has no concern.

Similarly, when Köhler, in his study of chimpanzees, used the phrase "The ape observed with great interest what I did", he protested that he did not mean to imply anything about the ape's consciousness.³²³ All that is meant is an observable and highly characteristic attitude which is much the same for a chimpanzee as for a man.

The dispute between those who would limit psychology to the study of behaviour and those who would also admit introspective accounts of mental processes as at least part of its subject matter seemed at one time to be a serious one threatening to split psychologists into two groups pursuing divergent ends. This is not, however, the situation now. An increasing number of psychologists of all schools recognise the desirability of making their investigations as behaviouristic as possible. On the other hand, the extreme position of the early behaviourism of J. B. Watson²⁹⁸ is generally recognised as untenable and as leading to dangerous and unnecessary impoverishment of psychological study under the pretext of making it scientific.

With the more moderate programme of the behaviourists of the present day, other psychologists can have no fundamental quarrel. They have their own field of investigation and their own methods, but the ultimate aims of psychology are only to be attained by the development of many different methods, and each of us can only hope to be an investigator in a limited field of our large subject.

The existence of different schools of psychology is not necessarily evidence of divergent aims, but of necessary specialisation of research. The student must know something of the work of all schools and must understand the technical language of each. National and local antagonisms and the individual ambitions of psychologists may exaggerate the differences between these schools. They are best understood if we see them as converging approaches to the same aim of the scientific understanding of human thought and behaviour.

2. Psychology as a Science

In all sciences, common everyday observation was a source of knowledge before experiments were performed in laboratories. Men knew much of inertia and of forces by handling, throwing, and stopping missiles, before the science of dynamics was based on an extension of these observations by careful laboratory measurements of masses, velocities, and accelerations. Similarly, much was known of human behaviour and experience before psychological laboratories started their work during the last century. Yet laboratory experimentation and the controlled observations of the trained psychological observer have as important a part to play in the building up of a scientific psychology as that of laboratory experimentation in physics. In regions, such as the study of perception, of learning, etc., in which a body of experimental knowledge has been gathered, any system of psychology which ignores this body of facts proclaims itself to be a psychology of yesterday.

There are other regions (as, unhappily, a great part of social psychology) where we are still largely dependent on common observation because the body of knowledge obtained by scientific methods is still incomplete. This is the result of the immaturity of our science. It is to be hoped that, in the future, this incompleteness will disappear and that our knowledge of human behaviour will have been ordered and systematised by psychological experiments and observations in fields where this has yet hardly been attempted. Until then we must explain social behaviour as

well as we can in the light of common observation and of so much scientific knowledge as we have.

It is necessary to remember, however, that such hypotheses as we form must be tentative, and that, when we are in regions in which we have nothing except common observation to support us, the fact that we call ourselves psychologists gives us no more right to put forward our explanations authoritatively than anyone else has. Where the psychologist has special authority is where he builds his conclusions on experimental or observational evidence not known to the man in the street. An assumption of special authority when they are merely speculating on the basis of facts known to everybody has done much to discredit psychologists.

Science is not, however, the mere gathering of facts. Its most important work is the formation of general postulates each of which is explanatory of a large number of facts, and may be used as a method of predicting facts hitherto unobserved. A postulate which is confirmed by a large number of facts and contradicted by none, and which has been confirmed by its power to predict truly new facts, is a general law of science. Thus the law of gravitation includes all the facts connected with the falling of bodies towards the earth, the effect of their mutual attractions on the motions of heavenly bodies, the movements of pendulums, the displacement of plumb-lines in the neighbourhood of mountains, etc. When a fact can be shown to belong to a class of facts all of which are examples of a general law, it is said to be explained. The object of science is thus the ordering of the myriads of separate facts in the Universe under a relatively small number of laws. If we know these laws, we can predict and control the separate facts which are examples of the laws.

If this is recognised to be the ultimate goal of all science, it should be clear that psychology has advanced only a little way towards this goal. We have a multiplicity of facts about experience and behaviour, but few laws about which we can feel at all certain. The science of psychology is now at a stage at which we can form tentative postulates which serve to explain a certain range of facts but which may be expected to require modification as new facts are discovered. There is not even universal agreement as to what postulates are to be adopted. This is to be expected in a growing science, but it is confusing to the student.

It is likely to be a long time—perhaps centuries—before psychology becomes a system of general laws universally accepted and generally valid for prediction. It is now a science in the process of being made. In this process of making, however, important advances have been and are still being made. About

the middle of the nineteenth century, the foundations of scientific psychology were laid by Fechner, who put forward a law, based on experiment, which stated that the intensity of a sensation was proportional to the logarithm of the intensity of the stimulus producing it.⁸² Later Ebbinghaus, experimenting on the remembering of nonsense syllables, enunciated his law of forgetting which related the amount forgotten with the logarithm of the time which had elapsed since learning.⁷⁴ These are examples of simple laws connected with simple experimental situations. The relative difficulty of constructing a science of psychology as compared with the making of the older sciences is illustrated by the trivial nature of its first laws, and by the fact that later research has shown that these are not exactly true and that they are not even approximately true except in extremely simplified experimental situations. They formed, however, a promising beginning and have led to exploration of the more complex laws of perceptual processes (e.g. by the Gestalt psychologists¹⁵²) and of personality differences in which considerable success has now been achieved.

The same history of the formulation to begin with of simple rules adequate, if at all, only for simple situations, followed by recognition of the much greater complexity of the real problems as they occur in practice, is to be found in other fields of psychology as well as in sensation and memory. It is to be found, for example, in the history of the investigation of the learning process and of the measurement of individual differences. In these fields too there has been some measure of success in a preliminary formulation of laws whose completion lies far in the future. That there is still considerable controversy about most of the systems of hypothesis designed to bring order into some field of psychology is to be expected. It is symptomatic of the fact that the science of psychology is passing through a stage in which tentative hypotheses are being formed and then changed or discarded, and in which finality is not yet in sight.

There are other fields of psychology incompletely explored by scientific experiment; one is the difficult and perplexing field of *paranormal psychology* or *psychical research*. When reports of thought-transference, clairvoyance, etc., were first made, it was reasonable for the scientific psychologist to consider that these occurrences were so inexplicable that they might safely be ignored as mere delusions of credulous people or of untrained experimenters. Evidence has now, however, accumulated that these *psi* phenomena do certainly occur. There is overwhelming evidence that there can be knowledge of the contents of other people's minds or of environmental facts which does not come through the

senses or by any other "normal" means.²²³ There is almost as strong evidence for the mental production of forces exerted on objects which are not produced by any normal physical means.²²⁸ Such facts as these must also be brought within the system of hypothesis which is scientific psychology before that system can be regarded as complete. It can hardly be doubted that a radical revision of our view of the self and of its relation to the organism and the environment will be necessary for this integration of para-normal and normal experimental psychology to be achieved.

3. Pre-scientific Methods of Psychology

In any early discussion of a psychological topic we find general principles laid down which are supported by some single observation. We find such statements as "Animals are capable of . . . this is shown by the behaviour of X's dog who was one day observed to . . .". This is not science but is a promising beginning to what may become an integral part of science later. This method may be called *anecdotalism*.

We shall use the word "anecdote" for an account of an observation from which no conclusion can be drawn either because the observation is badly controlled with perhaps an unreliable observer or because it is a single observation made under conditions in which numerous similar observations would be necessary for the drawing of a valid conclusion. Suggestions supported by anecdotes may sometimes be brilliant guesses which turn out to be right when they are afterwards tested by an adequate number of strictly controlled observations and experiments. More often they are not, although valuable experimental conclusions may result from the attempt to test a wrong guess. Anecdotalism may provide a foundation on which science may be built, but it is not itself science.

When William James guessed that memory was not improved by exercise, he confirmed that conclusion by an experiment in learning by heart performed on himself.¹³³ This was little better than anecdotal evidence since the variability of remembering performances is so great that no reliance can be placed on a test of a single subject, and some of the conditions of the experiment were faulty. Nevertheless, his suggestion bore fruit in the more satisfactory and extensive experiments on the same subject by such investigators as Sleight.²⁴⁹ Also his suggestion turned out to have been right. More often, exact experimental enquiry proves that conclusions based on anecdotal evidence are at best only partially true.

Anecdotalism becomes a vice in psychology when it is mistaken for science, when conclusions established by a mere anecdote are

treated as if they possessed the authority of conclusions which have been fully tested out by scientific methods. This does not mean that the presence of anecdotes necessarily proves a book on psychology to be without scientific value. An anecdote may be used for the purpose of illustration although not for the purpose of proof. Also the exploration of a field of scientific knowledge by the anecdotal method is very generally a necessary preliminary to its conquest by adequate scientific methods of experiment and observation. Indeed its competent exploration in this way is an important step towards its final conquest, but this preliminary exploration must not be mistaken for the completed work.

Much of social psychology is still in the anecdotal stage because no crucial tests of the truth of its hypotheses have been devised. If one social psychologist says that men live in large groups because they have social instincts while another says that their social behaviour is entirely a system of habits that they have acquired, we are not at present able to suggest any experiment or controlled observation that will decide between these two hypotheses. We may think that the arguments on the one side are better than those on the other, but, in the absence of a crucial test, there remains the possibility of differences of opinion.

A very great part of the forward march of psychology is the contribution made by its different schools to the replacement of hypotheses based on anecdotal evidence by others more firmly grounded in properly controlled experiment and observation. Experiments on the higher thought processes, such as were carried out by Kulpe and those associated with him at Wurzburg,²⁸⁶ replaced the anecdotes about what was supposed to happen in the thinking mind which formed the foundation of much of the earlier associationist psychology. These and other experiments on the introspective side of psychology correspond to the observations of animal behaviour made by Thorndike,²⁷¹ Köhler,¹⁵³ and a host of others on the actual achievements of animals which replaced the anecdotes of untrained animal lovers.

There is another pre-scientific method related to anecdotalism for which there seems to be no recognised name, so I propose to call it "fantastic anecdotalism". It is the use of an anecdote which is not an account of an actual event but of one invented by the writer for the purpose of his argument.

Thus when James Mill wanted to give an example of the process of thought he said:¹⁹³

"I see a horse: that is a sensation. Immediately I think of his master: that is an idea. The idea of his master makes me think of his office; he is a minister of state: that is another idea. The

idea of a minister of state makes me think of public affairs ; and I am led into a train of political ideas ; when I am summoned to dinner. This is a new sensation, followed by the idea of dinner, and of the company with whom I am to partake it . . .”

This does not appear to be a genuine account of what Mill observed to pass through his mind when he actually saw a horse. I may be unjust to Mill, but I suspect that it is an account of what he thought, when sitting in his study chair, would have passed through his mind if he had really seen a horse. If this suspicion is correct, this is not a genuine introspection but a mere fantastic anecdote

Similarly a writer on psychology who, in the course of a discussion of the James-Lange theory of emotion, said “A madman presents a pistol at me” was using this method of fantastic anecdotalism. We can be reasonably certain that no madman has ever presented a pistol at the psychologist. He was merely guessing about the nature of the emotions he would have had if a madman had done so. From such guesses, scientific conclusions cannot be validly drawn. This may seem to be too obvious to be worth emphasising, but if a careful examination of psychological books of the pre-scientific period be made, a surprising number (by no means all) will be found to base many of their conclusions on such fantastic anecdotes. Principles of Association of Ideas were based on fantastic anecdotes of processes of thought, and theories of perception were based on fantastic anecdotes of the perceptual experiences of a blind boy with one finger, while Condillac based a theory of sensations on fantastic anecdotes of a statue which had only a sense of smell.⁵⁷

Anecdotalism itself is of limited or transient use to a scientific psychology ; it may be justified either as illustration or as preliminary to scientific investigation. Fantastic anecdotalism, on the other hand, while it may perhaps sometimes be justified as illustration, for which purpose it is often very misleading, can never be a proper method of supporting a conclusion, not even a preliminary method of supporting a tentative conclusion. The use of fantastic anecdotalism is a vice which must be avoided by any investigator whose aim is scientific, to whatever school of psychology he may belong.

An illegitimate use of speculation must also be classed with the methods which scientific psychology rejects. The foundations of scientific method were laid when men turned from the use of speculative reasoning as a source of information about the natural world and applied themselves instead to the study of facts. That is, they no longer hoped to find out by intellectual processes of

thought what must be, but to discover, by examination of reality, what is. In the scientific field, speculation had proved an uncertain guide. Men's reason told them that bodies fell with velocities proportional to their masses, but experiment proved they did not. The speculative method led them to the conclusion that a vacuum was impossible, but experiment succeeded in making it.

To assert that speculative methods are unable to determine what is true and what is false in nature is not, however, to deny all value to speculation in science. Speculative intellectual thought has a function of high importance: that of suggesting what *may* be. What actually *is* must afterwards be decided by experiment and observation. Every suggested hypothesis which tries to order a variety of facts under a single law is, at the beginning, an act of theoretical speculation. The ability to speculate well is of at least as great importance to the advance of our science as is the ability to experiment well, and it is probably rarer. Wertheimer's bold speculations which formed the theoretical basis of the Gestalt theory are a good example of speculation which has borne fruit in a rich harvest of experiments on perception, many of which have elucidated problems which could not even have been formulated without the theoretical guidance of the initial speculation.¹⁷²

More ambitious and less controlled by the discipline of intellectual method are the speculations of Freud in his psychoanalytical theory.⁹⁷ Although these speculations may have great value as a practical guide in the treatment of psychoneurotic patients, their value to theoretical psychology has been greatly reduced by the disinclination of both Freud's followers and of his critics to test the truth of his hypotheses by exact experiment and controlled observation, and also by a certain lack of system in the hypotheses themselves. This lack of system sometimes leads the critics of this theory to fail to appreciate the importance of the facts asserted by the psycho-analysts, when their real quarrel is with the way in which they are stated. For example, if it is true that, before the age of five, a boy experiences a passionate love for his mother which colours his later emotional development, this is an important fact in developmental psychology whether or not we agree with the implications of such phrases as *Oedipus complex* and *infantile sexuality* by which Freud describes it. The statement that infantile relationships with the parents do determine later emotional development in such respects as choice of a mate and attitude towards authority, is clearly a proposition that could be properly tested by statistical evidence. Instead of this having been done, it has been supported by mere anecdotes and refuted by opposed anecdotes. Freud has probably made a great contribution to our

knowledge of the human mind, but it is merely the raw material of a scientific psychology. The testing out of his propositions and the systematising of his speculations will be the work of many years

Sound speculations, ordering already gathered experimental data and providing a guide to new experimentation, are as necessary to psychology as they have been to the physical sciences in the past. It is often more difficult to think of a right theory than to perform experiments to test its rightness when it has been thought of. It is unlikely that we have even the language in which we could state the psychological hypotheses that will seem to be adequate in a hundred years' time. There is, then, much room for the legitimate exercise of speculation in psychology. Speculation only becomes harmful in the development of science when it abandons the role of suggesting possibilities and usurps the function of determining what are the facts

Since psychology is a relatively young science this harmful use of speculation is relatively common in it. When alternative explanations present themselves it is easier to decide between them in an armchair than by means of a laboratory experiment which may prove arduous and inconclusive. An alert and active intellect may derive much pleasure and some fame by defending speculative theories by argument. Lacking the humility and patience—and perhaps even the experimental technique—for testing his theories in the laboratory, many a student of psychology is led along the primrose path of speculation. His contributions to the subject are only likely to increase the present confusion without advancing knowledge. Instead of helping to settle existing problems, he contributes intellectual puzzles which may entertain the academic mind but which have no significance for the understanding and control of human experience and behaviour.

4. Factual and Verbal Problems in Psychology

The systematic student finds it necessary to develop some method to enable him to decide which of the many problems discussed in his subject require his serious attention and which are merely the litter of past speculations. William James gives an example of a hunting party who were divided by a bitter controversy as to whether, if a man went round the trunk of a tree with a squirrel keeping always the opposite side of the tree, the man would or would not have gone round the squirrel.¹³⁴ He was able to bring peace to the party by pointing out that their difference of opinion did not turn on any difference of fact as to the relative motions of man and squirrel but only on two different ways of using the phrase "to go round". If it were defined in one way, the man

could truly be said to have gone round the squirrel, but if defined in the other way, the statement would be false.

The question in dispute was a *verbal* and not a *factual* one. The essence of the dispute lay in the failure to recognise its verbal character, so the problem was argued as if it were factual. The hunters thought that they were differing on the actual nature of the man's motion relative to the squirrel and not on how they should use a word.

A dispute of the same order may be found between two psychologists discussing the nature of intelligence. One says that intelligence is *general ability*, while the other says that it is *insight*. They may discuss this question as if it were one of fact, but it is clear that it is really a question of how the word *intelligence* is to be used. No experiment and no observation could settle the problem in dispute. It is not a factual problem but a verbal one.

That such a dispute as this is an idle one is not because it is verbal but because the disputants fail to recognise its verbal character and treat the matter in dispute as if it were a question of fact. It is plainly very necessary that verbal questions should concern the psychologist. We may not always have agreement as to the manner in which certain words are to be used in psychology, although this also is desirable, but we must indicate precisely in what sense we are going to use them. One of the causes of meaningless discussion is the use of vague and ill-defined terms. The habit of definition is a useful safeguard against this tendency. If, amongst some scientific thinkers at the present day, the defining of terms is regarded as a bad habit, this is only because speculative thinkers have sometimes used definition as a method of deciding facts and not merely of making clear the senses in which words are being used.

Proper use of the method of definition is very necessary if we are to avoid verbal confusion in psychological discussion. In order to define what we are talking about, we can conveniently follow the method of Aristotle by asking two questions: (1) to what general class does it belong? and (2) what is an important distinguishing mark by which it differs from all other members of the same class? If our definition answers these two questions clearly, it is impossible for anyone to misunderstand our use of the term defined.

Thus we might define a whale as *a marine mammal that spouts*. *Marine mammal* is the general class to which the whale belongs; its habit of spouting distinguishes all whales from all other members of the same general class. Similarly, we may define *intelligence* as *general intellectual capacity*. We have then made it clear what

we are talking about. The general class is that of intellectual capacities. But there may be other intellectual capacities such as the capacity to do mathematics or music which are not *general* or all-round intellectual capacities but capacities in a particular field. The word "general" in our definition of intelligence excludes such particular intellectual capacities and indicates that the specific kind of intellectual capacity to which the word "intelligence" refers is all-round or *general* intellectual capacity.

If the specific character of being general, by means of which we have defined intelligence, is sufficient to indicate unambiguously what we mean, we shall not improve but worsen our definition by introducing a further specific character. *Intelligence* is sometimes defined as *innate general intellectual capacity*. The introduction of this new word "innate" (meaning determined at birth) does not make it more clear what we mean by the word "intelligence" but on the contrary introduces uncertainty and confusion. It is as if we defined a whale as "a marine animal that spouts and has a horizontal tail". Uncertainty is introduced as to which is the correct specific character for distinguishing the whale. What about a marine animal that spouts and has not a horizontal tail, or that has a horizontal tail but does not spout? The definition appears to deny either of these membership of the class of whales. But perhaps what is meant is that there are no members of the above two classes and that all marine animals that spout also have horizontal tails. In that case the clause "and has a horizontal tail" is redundant since it merely defines the same class as that already defined. It is part of the description of a whale, but it serves no useful purpose when our intention is not to describe but to define.

The definition of intelligence as "innate general intellectual capacity" is open to graver objections since it is not intended to imply that we are not to call anything intelligence which is a general intellectual capacity that is not inborn or which is an inborn intellectual capacity that is not general. What the definition is intended to imply is that all general intellectual capacity is inborn. This obviously may or may not be true; general intellectual capacity might be wholly or in part acquired during one's lifetime. Not only might this be true but there is much evidence, which will be discussed later, that it is true that general intellectual capacity is partly not innate. The objection to the definition does not, however, rest on the fact that its implications appear to be false. Even if it were true that all general intellectual capacity were innate, it would be wrong to try to settle a question of fact by a definition. We could define intelligence as "innate intellectual capacity" and

leave it to be decided by observation and experiment whether intelligence as so defined was general and included all general intellectual ability, or we could define it—as we have done—as “general intellectual capacity” and try to discover empirically whether intelligence as so defined was altogether innate. In either case we have left clear the problem of fact which is obscured by the definition of intelligence as “innate general intellectual capacity”.

It is clear that no question of fact can be settled by making a definition. Defining intelligence as “general intellectual capacity” leaves to be settled by empirical methods the problem of whether any intellectual capacity is general. We shall consider in a later chapter the evidence on this question. Nor can we hope to prove that our definition gives the right way to use the word “intelligence”; another psychologist may say that he is going to use the word “intelligence” in a different way, and put forward another definition. Provided we both understand the sense in which the other uses the word, there need be no dispute as to facts between us. The same facts will be expressed in different words if the words are used with different meanings. We may claim that ours is the more generally accepted meaning; there is no absolute sense in which we can claim that our meaning is the right one. We may appeal to the dictionary, but we must remember that the better the dictionary the less use it will be for settling verbal problems, the *Oxford Dictionary*, for example, tries to give all ways in which words have been used, and if our opponent has adopted an entirely eccentric and individual way of using the word “intelligence”, which he succeeds in persuading some other people to copy, his use of it will ultimately find its way into an appendix of the *Oxford Dictionary*.

A bad definition, on the other hand, simply leaves us uncertain as to what the writer is talking about, and we cannot be sure whether he differs from us in fact or only verbally. When an educational psychologist says, for example, that intelligence is “best defined as a function of the central nervous system”, he gives us little guidance as to what meaning he attaches to the word. He has told us that it belongs to the general class of “functions of the central nervous system” (a wide and rather indefinite class), but he has not told us in what way it is to be distinguished from other functions of the central nervous system. He has not defined “intelligence” at all.

There are, of course, other ways of indicating what our words mean, as well as the Aristotelian method of definition. We might say, for example, that animals are such things as rabbits, fishes, birds, etc., or that “perception” means such activities as seeing,

hearing, smelling, etc. The use of this method of indicating the meaning of a word assumes that the common property of the class designated will be made clear by simply enumerating some members of it. Often this assumption is justified, and the method avoids some of the difficulties and obscurities of definition of an abstract term, but it has the disadvantage that it does not indicate the limits of what is meant. The above accounts of the meanings of "animal" and "perception" might, for example, leave the student doubtful whether a sea-anemone was an animal and whether the activity of imaging was perception.

Verbal problems have their own important place in psychological work. It is necessary, however, to learn to recognise their nature, so that they may not be treated as factual problems. If this is done, much of the lumber of psychological controversy may be cleared away. The controversy as to the existence of human instincts is, for example, largely verbal. It is only when the verbal differences between the disputants are cleared up that we can see plainly the residuum of difference as to matters of fact which divides them. This difference, though real, is much less than appeared at first sight, and less difficult to resolve.

The scientific psychologist tries to recognise the true nature of verbal problems and to avoid the error of treating them as factual ones; *meaningless* problems he wishes to avoid altogether. A meaningless proposition is one whose truth or falsity would lead to no difference in the realm of actually or potentially observable facts. It may not be easy to be sure that a particular statement in psychology belongs to this class. The problem of whether the mind occupies space seems to me to be quite meaningless. If, in the future, someone discovers some observable fact which depends on whether or not the mind occupies space, the opinion that it is meaningless will be proved to be wrong. Often, of course, there are insuperable practical difficulties in making an experimental test of a truly factual problem, as of many of the problems of the effects of nature and nurture in the human child. Such problems are not, for this reason, to be regarded as verbal or meaningless.

It sometimes happens that a psychological writer says that a statement is meaningless when he really means that it is false. He may say, for example, that so and so is true because it would be meaningless to assert the opposite. This cannot, however, be correct, for it is a characteristic of a meaningless proposition that it makes no sense either to assert it or to deny it. If a statement *X* is true, then a denial of *X* is false; if the denial of *X* were meaningless, then *X* also must be meaningless.

It is not always easy to disentangle verbal and factual elements in a problem, and still less easy to decide with certainty that an apparent psychological problem is a meaningless one. The habit of asking, when faced with any proposition, "What observable fact would be different if this proposition were true or false", is one that will always be found a useful guide. It enables us to decide which are problems that we can hope to settle by experiment or observation, which are problems that will disappear when we have agreed as to our use of words, and which are problems that it is useless for us to waste time on.

The goal at which modern psychology is aiming is the establishment of a scientific psychology—that is, the formation of a body of hypotheses which will enable us to understand and control human behaviour and experience. Psychology does not become scientific by adherence to any particular school. The schools of psychology are very largely different traditions of method and interest pursuing the same goal. In all of them we can see the attempt to replace anecdote and fantastic anecdote by the results of experiment and controlled observation. In all of them there is a turning away from speculation and from verbal and meaningless disputations. All are converging towards the one aim of building up a science of psychology.

CHAPTER II

THE INNATE PATTERN REACTIONS

1. Pattern Reactions

When we study the behaviour of men, or more strikingly when we study the behaviour of lower animals, we notice that a number of systems of consecutive actions are carried out in a more or less invariable manner. Examples are to be found in the actions of a chick drinking, a man shaving, or in the blinking of the eyes when an object is brought rapidly towards them. A general name for these more or less uniform actions is *pattern reactions*.

Some pattern reactions are individual possessions acquired during an individual's life, such as habit systems, *e.g.* shaving; others are common to all members of the same species, such as instinctive and reflex modes of behaviour, *e.g.* the instinctive action of the chick drinking and the reflex act of blinking. To account for such complex pattern reactions as habitual and instinctive behaviour, we postulate permanent psycho-physical dispositions*. Of these dispositions, some are acquired by the lasting effects of the individual's previous behaviour or by the action on him of the influence he receives from his environment; others are innate, belonging to all members of the same species. It will be convenient to consider first those pattern reactions which have an innate disposition as their basis. Three kinds of these have been described: tropisms, reflexes, and instincts.

2. Tropisms

The tropism is the simplest form of adaptive (or useful) pattern reaction, distinguished by the fact that it is rigidly determined by the direct action on the organism of physical or chemical stimuli. Such reactions are to be found in plants whose roots grow downwards in the direction of the Earth's gravitational field (positive geotropism) and whose leafing stems grow towards the light (positive heliotropism). The tropism has also been suggested as the movement mechanism of simple animal organisms. Unicellular

* The word *disposition* is not used for something that can be itself observed. What we observe are behaviour and the patterns in which particular behaviour sequences occur. We notice, however, that the same pattern of behaviour may recur in one individual or that it is found to occur amongst different individuals. The disposition is the hypothesis we employ to express the fact of these recurrences of patterns of behaviour.

organisms, such as the Protozoon *Euglena*, are found which swim towards a light, and other organisms, such as the larva of the blowfly, move away from light to darkness. These have been called positively and negatively phototropic respectively.

These differences are explained in the theory of tropisms by supposing that light shining on one side of a positively phototropic protozoon makes the locomotor organs on this side contract less strongly than those on the opposite side.¹⁷¹ The animal is thus directed towards the light and, when it faces it, continues to swim in that direction because the light, shining equally on both sides of the animal, has no further tendency to change its direction.

There is, however, no reason for supposing that this is an adequate explanation of the behaviour even of the simplest organism. H. S. Jennings¹⁴⁰ has described observations of individual animalculae moving under the influence of warmth or of light. These seem to show that the simple tropistic formula appeared to earlier observers to be plausible only because they observed the end result of the stimulus (swimming to or from it) and neglected the steps by which this end was attained. For example, the Protozoon *Oxytricha fallax*, which swims from hot or cold water to water of a moderate temperature, shows no such simple turning movement as is assumed by the tropistic theory. If the movements of individuals are carefully examined, it is seen that, when the temperature of the water in which they are swimming rises or falls, they make rapid movements, reversing their direction of progress, backing, and turning to the right. They are thus rapidly scattered, and collect in the part of the water of moderate temperature because when they reach this part they cease to give the reaction and therefore continue to swim forwards. Their behaviour suggested to Jennings a type of reaction which he has called *trial and error* behaviour.

The same observer has also reported varying responses of a very simple organism to the same stimulus, thus showing that the physiological condition of the organism plays a part in determining the response, and that the resultant behaviour is not merely a mechanically determined product of the stimulus. When, for example, water mixed with carmine particles is allowed to reach the disc of the Protozoon *Stentor*, this animalcule shows the following reactions: (1) it begins by not reacting at all, (2) it turns over several times into a new position, (3) then it momentarily reverses the ciliary current, (4) next it contracts strongly and repeatedly, (5) it contracts for a longer time, and, (6) becoming detached from its base, it swims away.¹³⁹ Since the stimulus remains the same throughout these reactions, it is clear that what changes is the condition of the *Stentor* itself.

Jennings has also described complicated chains of behaviour in *Amoeba*, including the pursuit, capture, and ingestion of one *Amoeba* by another, the escape of the captured *Amoeba*, its recapture, and final escape.¹⁴⁰ These seem impossible to explain by any formula of mechanically determined response to stimulus, and seem rather to show a primitive form of purposive adjustment to a goal such as is found in a more fully developed form in intelligent action.

3. Reflex Action

The *reflex* is also a simple innate pattern reaction in which a movement of a serviceable kind is carried out. It differs from the tropism in the fact that it is a response in which conduction of an impulse along nerve fibres plays an essential part. Examples are to be found in such reactions as blinking the eyes when an object approaches them, sneezing when there is irritation of the inner membrane of the nose, the dog's scratching when he is stimulated anywhere over a saddle-shaped area on his back, or the dilatation and closing of the iris of the eyes in dim and bright light respectively.

It will be noticed that these are all responses of a part of the organism to a stimulation produced by something in its environment, and that the response is serviceable to the organism. Blinking protects the eyes from a noxious contact, sneezing and the dog's scratching are methods of removing the object making the contact, while the changes in diameter of the iris keep fairly constant the amount of light admitted to the retina under different conditions of external illumination. Some of these reactions come normally into consciousness and are to a large extent under conscious control, *e.g.* the sneeze, while others cannot be made the objects of introspective observation and cannot be controlled, *e.g.* the adaptations of the diameter of the iris.

Reflexes are defined by Sherrington as follows: "reactions, in which there follows on an initiating reaction an end-effect reached through the mediation of a conductor, a nerve itself incapable either of the end-effect or, under natural conditions, of the inception of the reaction".²⁴⁶

Physiologically, reflex action requires at least three different structures—an organ for the reception of the stimulus (the *receptor*), a conducting nerve path leading to the organ at which the reaction takes place (the *conductor*), and the organ, muscle, or gland which reacts (the *effector*). A single reflex taken apart from all other reflexes is called a *simple reflex*, and the three structures, receptor, conductor, and effector, activated in the simple reflex are called the *reflex arc*.

The fact that many reflex actions are under conscious control shows that the physiological structure of these reflexes is not so simple as the above scheme suggests, but that the reflex arc must have also an alternative path to the brain. That this is not the sole conducting path of the nervous impulse of the reflex is shown by the fact that the reflex response may persist after transection of the nerve fibres passing to the brain from the spinal cord. For example, a spinal dog, *i.e.* a dog on whom this operation has been performed, displays the scratch reflex when stimulation is applied to a certain area of his back. This reflex response is more automatic and invariable in character than would be the response obtained by the same stimulation from a normal dog.

Sherrington points out that the simple reflex is a somewhat artificial abstraction, for no reflex arc functions as an independent mechanism. The nervous system works as a whole. The integration of various reflex mechanisms into the complex machinery of the whole nervous system below the cerebral cortex is the subject of his book *The Integrative Action of the Nervous System*.²⁴⁶

4. Instinctive Behaviour

We may take as an example of an instinctive reaction the behaviour of the larva of the Capricorn beetle (*Cerambyx*) described by Fabre.⁸¹ This grub spends the larval and pupal periods of its existence in the interior of an oak tree, feeding on the wood of the oak, and, incidentally, cutting a passage in the interior of the tree with its powerful jaws. It appears to possess neither sight nor hearing, and is picturesquely described by Fabre as "a fragment of intestine with a mouth". Yet when the time comes for it to become a pupa, before changing into the fully developed beetle, it carries out a complicated series of actions to secure the safety of the pupa and the safe access of the developed beetle to the outside air.

It begins by opening a passage to the bark of the tree, leaving only a thin barrier of bark or none at all (for the mandibles of the beetles will not be powerful enough to overcome a thick obstacle). It then retires deeper into the wood, securing the pupa against danger from woodpeckers, and makes a chamber, rasping wood from the sides so as to line it with a kind of down, for the pupa is delicate. It builds a threefold door, part of which is a layer of calcium carbonate thick enough to resist the attacks of outside enemies but not thick enough to be an obstacle to the developed beetle. It then becomes a pupa with its head directed towards the entrance to the chamber, for, the developed beetle, being too stiff to turn in the chamber, would be hopelessly imprisoned if the pupa were formed lying in the other direction.

We have here an example, one of many which could be taken from the same source, of a complicated course of action securing an end with a precision which we might at first sight be tempted to attribute to foresight and thought. Yet it is carried out by a creature which is clearly devoid of the mental equipment necessary for either, and under conditions where neither would be of any value, for the Capricorn grub has not seen a pupa or a developed beetle and it has had no opportunity of being taught the operations by one of its own kind. It is a course of activities whose origin is an innate disposition in the grub. To such a disposition we give the name of *instinct*.

Certain characters are common to all such instinctive courses of action. These are as follows:

- (1) Their adaptive character (without necessary knowledge of the end to be attained).
- (2) The smallness of the extent to which they can be modified to meet with novel factors in the situation.
- (3) Their universality amongst members of the same species.
- (4) The remarkable degree of perfection of their first performance (a process of learning may be almost or completely absent).

5. Adaptive Character of Instinctive Behaviour

A striking feature of many instinctive courses of action is their great complexity. The procedure of the *Cerambyx* grub, if it were an intelligent series of actions, would show a high degree of foresight and anticipation of future dangers and difficulties threatening the pupa and beetle. Yet there is clearly no such conscious anticipation; the behaviour of the grub is the product of an inborn disposition. It is clear that it is necessary to give up the view that the precise adaptation of a course of action to an end is a mark of intelligence. Indeed, provided the end to be attained is the satisfactory dealing with a situation normally met with in the life of an individual of that species, such precise adaptation is the mark of instinctive rather than of intelligent action.

6. Relative Invariability of Instinctive Behaviour

The second character of instinctive action—its relative invariability—is shown when the situation to be dealt with is different from that normally met with in the development of the individual concerned. The animal which can deal so wonderfully effectively with a normal situation may be helpless if the situation is altered even slightly from the normal.

If a beehive is moved for more than a very short distance while the bees are collecting nectar, the flying bees return to the old position of the hive and will die there instead of making the modification in their customary way of returning to the hive necessary for them to enter the door in its new position. Fabre showed that when a line of the Pine Processionary caterpillars was broken and the two ends joined together so as to form a ring, they followed each other round the top of a flowerpot for seven days without food before the ring broke up and they returned to the nest.⁸¹ The solitary wasp was observed by the Peckhams always to build its nest and then to seek and sting a caterpillar and drag it to the nest.²¹³ If it had stung its prey a long way from the nest, it would take hours dragging it to the nest and might be forced to abandon the victim altogether instead of adopting the easier alternative of building its nest near the caterpillar.

Different interpreters of animal behaviour have not agreed as to the amount of rigidity which must be attributed to instinctive behaviour. The question is of fundamental importance for the application of the conception of instinct to human life and behaviour. For, if instinct is essentially unadaptable to new circumstances, the conception of instinct will have little value in elucidating the problems of human behaviour, the predominant feature of which is plastic adaptation to new conditions. If, on the other hand, this plasticity is inherent in all instinctive behaviour, although embryonic amongst primitive organisms, we may regard human intelligence as no new thing replacing instinct but simply as a development to a very high power of this primitive rudimentary plasticity. This plasticity may be supposed to have increased in the course of the evolution of the higher mammals because organisms were becoming adapted to environmental conditions so complex and varied that rigid and invariable responses would have been of no value.

7. Universality amongst Members of the same Species

The universality of certain instinctive patterns of behaviour amongst members of the same species and the frequent, although not universal, perfection of these patterns on their first appearance are the two main grounds on which is based the view that instincts are innate reaction patterns and are not learned systems of behaviour even in those frequent cases in which the first appearance of the instinctive behaviour pattern occurs some time after birth. It is clear that uniformity in the behaviour of different individuals is evidence of its innate origin if, and only if, the uniformity is still found when other possible causes of such uniformity

have been eliminated. Imitation, or learning through social influence, can produce amongst animals and men uniformities of behaviour which might, at first sight, seem to be due to hereditary tendencies.

It was supposed at one time that all the uniformities of animal instinct might be explained as due to learning by social influences, but both observation and experiment show that there is much in animal behaviour patterns which cannot be explained in this way. The behaviour of the *Cerambyx* grub, which we have already taken as a typical example of instinctive behaviour, is clearly not due to imitation, since the grub has had no experience of other grubs carrying out the behaviour preliminary to pupating. Examples might be multiplied of animals similarly carrying out adaptive courses of action with no previous experience of the conditions for which they are adapted and no opportunity of learning from others of their own kind.

The same question has been attacked by the method of experiment. The instinctive reactions characteristic of its species are found to develop in an animal even if it has been separated from its kind from the time of its birth, so that learning by imitation has been impossible. There may, however, be variations in the details of its performance, showing that these details are not innate but are imitated or learned from its parents.

Instructive in this connection are the experiments of Scott on the development of song in Baltimore orioles²⁴² and of Breed on the development of pecking in chicks.³³ Scott isolated young Baltimore orioles before they had heard any of their own kind sing. Their early incomplete attempts at song were like those of the wild bird. Finally they became good and voluble singers. Their adult song, however, was unlike that of the wild orioles except for the occasional use of the rattle. He obtained similar results in experiments on other birds. Thus, while both the tendency to sing and the details of the song are found to be almost invariable amongst birds of the same species, these experiments show that the first only of these characters is innate while the other owes its uniformity to social influence.

In contrast with these results, the pecking reaction in chicks seems to be a behaviour pattern which, although it improves during the first few days of the chick's life, shows no dependence on social influences. Breed made curves showing the improvement in accuracy of two groups of chicks, of which one started pecking by themselves while the other started with other chicks ten days older than themselves who had already learned to peck.³³ In both groups

the performance was relatively imperfect at first with rapid improvement during the first few days, but the group that had the possibility of profiting by imitation of the older group improved no faster than did the others. Even two chicks kept in complete isolation during the time of the test improved as rapidly as those who acquired the pecking reaction in the company of their fellows.

Since man has developed such effective instruments for the production of uniformities of behaviour by social influence as language and the traditions and group opinions which depend on language, it is particularly dangerous to infer that a uniformity of behaviour found in a human group is necessarily instinctive. Even where such uniformities are widespread, as earth burial, prohibition of incest, etc., the possibility that they may have spread by transmission of culture must be considered before it is safe to conclude that they are direct expressions of instincts.

8. Relative Perfection of First Performance

This also is a character in which a primitive instinctive reaction differs from the kinds of behaviour most characteristic of human life. The man who has learned to swim by prolonged and laborious effort feels a pang of envy when he sees the duckling swimming without difficulty on its first entry into the water. The complicated behaviour of the *Cerambyx* grub is carried out without any previous experience to guide it.

Yet here again we must avoid exaggeration. The instinctive reaction is not always perfect on its first appearance; many cases have been observed in which an improvement in the reaction takes place in later performances. The general rule appears to be that an instinctive reaction on its first appearance is sufficiently perfect to be serviceable. It is clear that this degree of perfection is biologically necessary. The young bird on first leaving its nest does not fly so well as it will in a few days, but it flies well enough to save itself from falling to the ground. If it did not, every young bird hatched in a nest high up from the ground would be killed on its first flight and its flying instinct would have no survival value.

It remains to be decided whether the improvement in an instinctive reaction is due to improvement by practice or to the progressive maturing of the mechanism of muscle and nerve by which the action is carried out. In other words, we ask whether the improvement is due to *learning* or to *maturation*, bearing in mind the possibility that these may both be factors in the improvement. What is meant by this question may perhaps be best illustrated by a familiar example from human behaviour. A boy, let

us say, begins to learn tennis at the age of twelve. By the time he is fourteen, he is a much better player than he was when he was twelve. One factor in his improvement is undoubtedly learning which has taken place partly by the elimination of faulty movements during the course of practice, partly by imitation, and possibly partly by verbal instruction on the right ways of playing. But in addition to this his muscles are stronger and probably his neuro-muscular co-ordination better at fourteen as a physical consequence of his increased age. Maturation has, therefore, also played a part in his improvement.

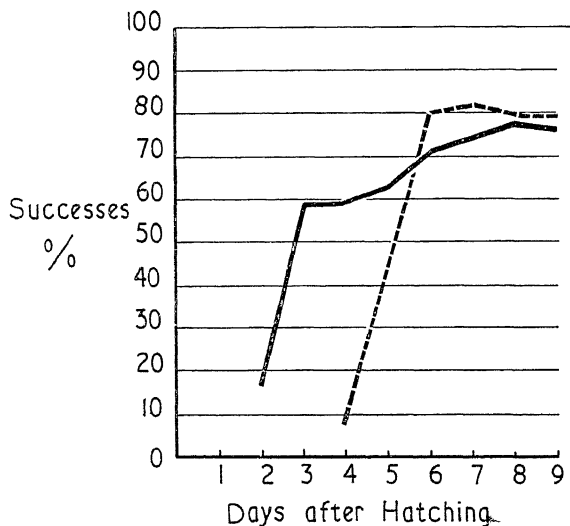


Fig. 1.

The fact that, in animal psychology, improvement in behaviour responses which at first sight we are tempted to attribute to learning may really be due to maturation is illustrated by a series of experiments made by Shepard and Breed on the development of pecking behaviour in young chicks.³⁴ The diagram above (Fig. 1) shows in the continuous line the mean accuracy of pecking on successive days of twenty-one chicks who were allowed to start pecking in the normal way on the second day after hatching, while the broken line shows the mean rate of improvement of ten chicks which were hand-fed during the second and third days and were only allowed to start pecking for themselves on the fourth day. It will be seen that the initial accuracy is low in both cases. Subsequent improvement (at any rate in the chicks whose initial

pecking was delayed) must therefore be due, to some extent, to learning through practice. That this is not the sole cause of improvement is shown, however, by the much more rapid improvement of the chicks whose pecking behaviour was delayed. Their greater speed of learning must be attributed to their greater age at the time of learning, that is, to maturation of the bodily mechanisms used in the response. Since, moreover, maturation is clearly taking place between the second and fourth days, it follows that at least part of the improvement of the chicks who started pecking on the second day is due to maturation. It is suggested by the authors that the sharp change in slope of this curve on the third day is due to the fact that the earlier part of the rise is due to the combined effect of practice and maturation, while the less steep part of the curve after the third day is almost entirely due to maturation.

In this case, improvement in a response is seen to be due to the combined effect of maturation and practice. It is also sometimes found that the initial appearance of an innate response is delayed until the bodily mechanisms used for the response have attained a certain degree of maturity. An obvious example is the flying behaviour of young birds, which cannot take place until there is sufficient development of the wings and of muscles controlling them. The possibility of maturation determining the time of the first appearance of a behaviour element makes it necessary to be on our guard against assuming that a behaviour response not appearing until some time after birth must therefore be an acquired one. For example, the preference for the use of the right (or left) hand is certainly an innately determined characteristic—a child is right or left handed because he was “born so”. Yet it is reported that no consistent tendency to use one hand rather than the other is found during the first year of life.²⁹⁷ It appears that handedness is an inborn characteristic whose appearance is delayed until the organism has reached a certain stage of maturity.

9. The Biological Classification of the Instincts

Instincts have been classified in various ways. Some writers have classed as separate instincts the systems of movements co-ordinated together to form complex muscular activities, such as walking, swimming, nest-building, etc. Since, in fact, these activities, although they have an instinctive energy behind them, are themselves made up of movement systems which are only partly innate and in a large measure may be acquired, it seems better to call them separate motor mechanisms and to reserve the word “instinct” for the energy behind them which seems to seek a goal

and to use a variety of motor mechanisms for its attainment. Thus a rat may be running to food or to a mate. The motor mechanism is in both cases the act of running, but two different instincts may be said to be in operation in the two activities, since the energy behind them is directed towards different goals.

The instinctive driving forces behind animal behaviour have been classified, according to their evolutionary function, into three great groups:

- (1) The system of instincts of self-preservation.
- (2) The reproductive system of instincts.
- (3) The gregarious or social system of instincts.

The system of *instincts of self-preservation* comprises those innate tendencies which have as their biological function the survival of the individual possessing them. These are, for example, the tendency to seek for food, the tendency to escape from danger, and so on. It is clear that in the struggle for existence any animal lacking these tendencies would soon be eliminated, through death from starvation or by falling a prey to some other animal.

The *reproductive instincts*, on the other hand, have no value for the survival of the individual. These are the tendencies to find a mate, to construct a nest or other place for the rearing of the young, and to care for these young when they are born. From the point of view of individual survival, these tendencies have not only no survival value but may actually favour the elimination of the individual possessing them. The individual animal possessing no innate tendency to sacrifice its own safety and well-being for its mate or offspring would stand a better chance of living to old age. They are, however, clearly necessary for the continuance of the race. The individual deficient in these reproductive instincts would leave no offspring, and so by the operation of the ordinary laws of natural selection they are generally to be found in every individual.

The third group of instincts is one which at one time was supposed to present insuperable difficulties to the theory of natural selection. It includes not only the tendency for certain animals to live in large social groups but also their tendency to co-operate in activities in which the group acts as a unit, as in co-operative hunting, and also the mutual aid behaviour to be found amongst animals of the same species, such as care for sick and wounded. The extent of such co-operation and mutual aid behaviour amongst animals has been the subject of much controversy. Kropotkin considered that Darwin and his followers had over-emphasised the

universality of competition between animals and he collected much evidence of co-operative behaviour.¹⁵⁷ Although some of his evidence was anecdotal and it was highly selected to emphasise only one side of animal life, it is now generally agreed that such mutual aid and co-operation does occur although competition and mutual destruction is also found amongst members of the same species (destruction of wounded animals by their fellows seems commoner than their help).

T. H. Huxley explained the possibility of co-operative behaviour on the theory of natural selection by pointing out that it might happen in the course of evolution that the social group rather than the individual was the unit on which the laws of survival worked. Let us suppose, for example, that carnivorous animals are living in a region so depleted of the animals on which they prey that a single individual is unable to get continuously sufficient food to survive. It is then possible that a herd of such animals, being a more effective hunting weapon than the same number of individuals hunting separately, might still be able to maintain itself under these more severe conditions.

It is clear that those herds, the members of which had most strongly developed as individuals the qualities which made the herd an effective hunting body, would stand a better chance of survival than the herds composed of members that lacked such qualities. The qualities necessary would be all those which drove the individual to act with the herd in an effective manner, and with the minimum of interference from his self-preservative impulses when these tended towards action inimical to the good of the herd. Herds whose individuals had these qualities most strongly developed would survive while herds with less perfectly socialised individual members would tend to be eliminated; thus individuals possessing the social behaviour tendencies would have on the whole a better chance of surviving than those deficient in them.

This classification is a practically convenient one and may be used as the basis for a broad classification of human behaviour systems whether or not we call these systems of instincts. We can describe the behaviour of migratory birds which show alternation between gregarious behaviour in the winter and mating behaviour in the summer as showing alternation between behaviour belonging to the gregarious and to the reproductive systems. The human conflict between the demands of the sex instinct and the prohibitions of sexual behaviour imposed by social convention (the conflict which, according to Freud's theories,⁹⁷ is at the root of psycho-neurosis) may similarly be represented as a conflict between the forces of the reproductive and the social behaviour systems.

Such representation may be practically convenient. There is no reason, however, for asserting that the divisions between these systems correspond to essentially different innate driving forces. A bird collecting grubs may swallow a particular grub himself or take it to the young in the nest; behaviour for self-preservation and for the preservation of the young are inextricably entwined together. Still more difficult is it to make a sharp distinction between reproductive and social behaviour. The ant nest, which is often taken as the supreme example of the operation of social instincts, is in fact a large family. The behaviour of the ants in relation to the queen and the brood might equally well be regarded as behaviour arising within the reproductive system of instincts. Nor is this difficulty absent in the consideration of the behaviour of mammals. Zuckerman attributes part of the grouping of baboons to the sexual attraction of unattached males by the females belonging to the dominant male's harem³¹² Co-operative and mutual aid behaviour, moreover, occur most conspicuously in the family group. It is possible that human social life started in the family and that what appear as social behaviour tendencies are simply the extension to a larger social group of behaviour responses which innately belong to the family situation. If this is the case, there would seem to be some ground for Freud's hypothesis that the social behaviour system is derived from the reproductive system of instincts.⁹⁶

From such considerations as these we may be led to think of one general driving force behind the behaviour of the organism which can be directed into one kind of behaviour or another. This conception is found applied to human behaviour in the theory of the *libido* of Freud⁹⁷ and Jung¹⁴³ or the *horme* of McDougall¹⁷⁹. To some extent we can regard a human being's behaviour as if it were activated by a fund of energy which, like physical energy, can be directed into one channel or another, and which to some degree shows the property that if it is employed in one kind of activity, the amount available for other kinds of activity is reduced. It is an analogy which must not be pressed too far; there is no exact equivalence between the energy given to one kind of behaviour and that withdrawn from others. So far as this general conception of interconvertability of mental energy is trustworthy, however, it leads to the conceptions of "deflection" or "sublimation" which will be discussed in more detail in Chap. VIII.

CHAPTER III

FOUNDATIONS OF HUMAN BEHAVIOUR

1. Instinct and Intelligence

Before discussing the problem of what use may be made of the conception of instinct in human behaviour, it may be well to consider the traditional contrast between *instinct*, which was supposed to guide the lower animals, and *reason* or *intelligence*, which was supposed to guide human behaviour. There clearly is a difference between the ways in which human and sub-human behaviour is directed, but this difference cannot be so simply expressed as by a mere contrast between instinct and intelligence. When, in the last chapter, we considered the *Cerambyx* grub as an example of instinctive behaviour, we saw that its behaviour was both invariable and innate (or inborn). These, however, are different characters of the grub's behaviour which plainly need not be coupled together. A behaviour pattern may be innate or acquired; also it may be either automatic or variable. These are cross divisions of behaviour possibilities, and behaviour may fall into any of the four possible classes: invariable-innate, invariable-acquired, variable-innate, or variable-acquired. The tendency to sexual behaviour is, for example, innate; the behaviour itself may either be very automatic as in the frog, or very variable as in man. On the other hand, a dog's acquired habit of barking when the postman rings the doorbell may be as invariable as his innate response of turning round before lying down, while the acquired behaviour of a man when his doorbell is rung may be highly variable and dependent on his mood and his opinion as to who is the person ringing. There is also a third dimension in which behaviour may vary since it may be more or less well adapted to the situation in which it occurs.

When we point to a typical piece of instinctive behaviour such as that of the *Cerambyx* grub, we select one that is innate, invariable, and adaptive. Etymologically the word "instinct" implies only innateness, and if "instinct" is used in this sense it is to be contrasted with *habit* or acquired patterns of behaviour and not with intelligent, *i.e.* variable-adaptive, behaviour. Instinctive behaviour may be more or less intelligent, as also may behaviour which is determined by habit.

Although, used in its strict etymological sense, the word "instinct" implies no contrast with intelligence, the customary use of the

word does often imply that the behaviour spoken of is also invariable. There is a divergence of use which yields a plentiful harvest of confusion and controversy, as we shall see when we come to discuss the opinions that have been expressed on the problem of human instincts. The remedy for this confusion is to abandon the use of the word "instinct" where there could be misunderstanding as to its implications, and instead to specify the degree to which the particular behaviour we are talking about possesses the characteristics of innateness or acquiredness, of invariability or variability, and of adaptation and maladaptation to the situation in which it occurs.

We have here spoken of the "degree" to which a pattern of behaviour possesses these characteristics, since these contrasting pairs of characteristics are opposite poles of behaviour possibilities with an indefinite number of intermediate steps between them. There is no sharp line dividing innate from acquired behaviour or dividing invariable from intelligent behaviour. Any particular piece of behaviour may be anywhere along the line between these polar opposites. Behaviour with an innate basis may nevertheless be more or less influenced by habit formations acquired during the course of the individual's life. This is obviously true, for example, in what are often called human instincts. The tendency to run away when fear is experienced is at bottom innate, but the actual behaviour of the man in flight will show the operation of a number of acquired habit systems, of walking, running, cashing cheques, taking railway tickets, and so on. Similarly, behaviour may show a lesser or greater degree of variability. If the degree is small, the behaviour is little removed from purely invariable behaviour; if large, it becomes highly intelligent. Equally, it is obvious that behaviour may be to any degree well or ill adapted to the situation in which it occurs, and, also, it may be well adapted when it occurs in one situation and ill adapted in another.

A further reason for our being inclined mistakenly to contrast instinct (innateness of behaviour) with intelligence (adaptive variability) is that over a limited range of the animal kingdom these two characters do seem to be inversely correlated. If we compare a man with a bee we find him obviously more intelligent and less richly endowed with instincts. Such inverse correlation is, however, by no means an invariable rule. If we compare the higher vertebrates with animals as much lower in the scale of nervous organisation as, let us say, sea-anemones, we find the latter relatively lacking both in instinct and intelligence.

The important feature of the kind of behaviour we call "intelligent" is not merely that it is variable but also that it is adaptive.

We may also, of course, observe at times maladaptive variable behaviour, as when Kohler's chimpanzees, trying to solve the problem of reaching bananas too high to be reached from the floor or from the top of one of the boxes provided, tried to solve the problem by holding a box above the head and in contact with the wall and then trying to climb up on to it.¹⁵³ This was a new piece of behaviour and as such beyond the power of an organism much lower in the evolutionary scale than the ape, but it was useless as a means of attaining the end aimed at. Mere variability would be of no evolutionary value unless it tended also to be variability in the direction of getting correct solutions to behaviour problems. It will be convenient to have some term to include the conceptions both of variability and of the fact that behaviour is varied in a useful (or adaptive) direction. For this purpose we shall use the term *plasticity* of behaviour.

A comparative study of organisms at different levels of the evolutionary scale shows that the different levels of the plasticity of their behaviour is correlated with the character of their nervous systems. Lowest in the scale of plasticity of behaviour amongst animals with any nervous system at all are those like the jellyfish, with a nerve net transmitting impulses in all directions with no centralised control. These animals seem to have no nervous mechanism for varying behaviour, and show as nearly complete automatism as we find in animal behaviour, although perhaps not altogether complete. It seems that even unicellular organisms like *Amoeba*, with no nervous system, are not entirely lacking in plasticity of response.¹⁴⁰

The possibility of variability of response is increased with increased complexity of the nervous system. The possibility of adaptive variability of response becomes greater when nervous control begins to be centralised by the domination of part of the nervous system which becomes the principal centre for distribution and co-ordination of nervous impulses. Such a dominant ganglion in the head is found amongst the insects. Thus ants, whose behaviour is largely automatic, are reported to show a small but not insignificant degree of plasticity of response (Forel says that they are nine-tenths automatic and one-tenth intelligent).⁹¹ In the vertebrates the amount of centralisation of distributive functions in the central nervous system is greater and plasticity also becomes greater.

Increased plasticity of behaviour is not the only result of centralisation in the nervous system. This centralisation also results in increased power of *co-ordination*, the capacity of different parts of the organism to act in conjunction as mutually interdependent

parts of a single whole. Thus a man bitten on the leg by a mosquito may respond not by a movement of the leg but by crushing the insect with his right hand, the movements of which are directed by his eyes. The sense organs of the leg, the muscles of the arm and hand, and the visual apparatus, are all acting as parts of an integrated system. This co-ordination, or integration of behaviour, is not identical with plasticity of response, although both depend on nervous centralisation. Amongst the vertebrates, the spinal cord and the lower and mid brain remain centres of reflex responses, highly co-ordinated but nevertheless automatic.

The development of plasticity is correlated with development of the upper brain or cerebrum. Thus, low in the vertebrate scale, we have such animals as the snake, which may show even the complexly co-ordinated response of striking accurately at a hand touching it after its head has been cut off, thus showing that its poorly developed cerebrum plays no essential part in this automatic reaction.¹²⁹ Higher up in the vertebrate scale we find the cerebrum increasing in size and importance as compared with the rest of the central nervous system, a process culminating in ourselves. We find, too, greater plasticity of behaviour amongst such higher vertebrates, with its maximum development in man.

Nowhere in the animal kingdom do we find anything approaching complete variability in which all behaviour is variable and unpredictable. On a foundation of plastic behaviour tendencies we find built a large number of secondary automatisms or habit systems. These secondary automatisms are as characteristic of man's behaviour as is the plasticity of his innate responses. The importance of the original plasticity of response is that it is the condition for the development of a number of different habit systems appropriate to different environmental situations. It is by choosing between these different habit systems that man generally adapts his behaviour to new or unusual situations.

2. The Problem of Human Instincts

With the general features of the rough sketch of the differences between human behaviour and that of animals lower in the evolutionary scale, there would be little if any disagreement. On the question of whether the facts outlined should or should not be described by human instincts, there has been much controversy. When in 1905 William James suggested that man was more richly endowed with instincts than any other animal, he was putting forward a view opposed to that previously current according to which reason was the capacity which in man replaced the instincts of the lower animals.¹³³ It is true that James also thought that these

instincts were transitory and became replaced by habit systems. Even so, he seems not to have sufficiently recognised that the innovation he was making was not the announcement of a new discovery but a difference in the use of the word "instinct". Shortly afterwards McDougall made a theory of human instincts the keystone of his psychological system.¹⁷⁵ On the other hand, a fierce attack on the conception of human instincts was opened by J. B. Watson a decade later.²⁹⁸

The real difference of opinion on this topic was less than appears at first sight, since differences of statement were often due more to differences in the use of the word "instinct" than to differences in interpretation of the facts. When we read, for example, that James and McDougall say that man has many instincts, while J. B. Watson says that man has only a few instincts but a large number of tendencies to form habits, these statements appear at first sight to be in direct contradiction. When, however, we realise that Watson attaches a different meaning to the word "instinct" from that adopted by James and McDougall, and that their meaning of "instinct" is much the same as his "tendency to form habits", we are no longer certain that the two statements are not simply different ways of saying the same thing. Until we have distinguished between the verbal and the factual parts of the dispute about instincts, we cannot know what is the real difference in opinion about the nature of the forces behind human behaviour.

We may first notice a few essential facts about which there is complete agreement. In an earlier chapter, examples of instinct were drawn mainly from such organisms as insects, low in the scale of behaviour variability. These show patterns of behaviour which vary little either in the situations calling them out or in the nature of the responses themselves. Both the effective situation and the response are almost entirely determined by the inherited make-up of the organism and are little influenced by learning. If we restrict the word "instinct" to such automatic behaviour responses there can be no doubt that instincts are not found in adult man. About this fact there is no difference of opinion amongst psychologists.

On the other hand, few, if any, psychologists would consider that on its behaviour side the human organism is to be regarded as originally indifferent to the behaviour patterns imposed on it. The young baby shows unquestionably innate propensities to crawl, to suck, to babble, etc. He also inherits physical structures which limit his behaviour propensities in some directions and enrich them in others. His mobile and prehensile hands lead to his acquirement of manipulatory behaviour; the structure of his laryngeal organs gives him a capacity for acquiring language which is denied to the ape.

The young baby also shows the withdrawal impulses we associate with fear and the aggressive impulses that in the adult accompany anger. There is therefore an original or inborn element in his emotional responses, although it will not be his inborn nature but the particular events of his life that will later determine what things he is afraid of and what things make him angry. Even those emotional responses which are not found in early childhood, such as those of genital sexuality and maternal tenderness, undoubtedly have an inborn driving force, although in man the details of the behaviour they lead to are mainly acquired.

There can therefore be no difference of opinion as to whether human behaviour is partly determined by innate factors; that certainly is the case. In order to clarify the matter in dispute we must distinguish between the *structure* of a piece of behaviour (the actual sequence of movements carried out) and its *intensity* (the vigour with which it is carried out). In the invariable instincts of animals relatively low in the animal scale, both the structure of their behaviour and its intensity are innately determined. If, like Watson, we restrict the word "instinct" to such human responses as the crawling, babbling, etc., of an infant in which structure is innately determined, no psychologist would dispute the statement that human instincts are few and unimportant as determinants of adult behaviour.

On the other hand, we have such human behaviour tendencies as that of sex. The man in love may be carrying out any activity whose structures are certainly not innate but learned. He may be writing poetry to his beloved or engaging in some other acquired pattern of behaviour. Yet the intensity behind his behaviour is not the result of his experience. We may express the matter by saying that it has behind it an innate driving force which may be called his "sex instinct". The use of the word "instinct" adopted by James and systematised by McDougall is to indicate the innate driving forces behind such behaviour patterns as those of escaping from danger, mating, fighting one's enemies, etc. The use is legitimate although it has the danger that it may be misunderstood to imply that the structures of the associated behaviour are also innate. Also one is on more doubtful ground when one uses the term "instinct" for such a human behaviour system as that of constructing things. Here there is ground for dispute as to whether innate driving forces are behind human constructive activity. Still more dubious is McDougall's central hypothesis that the driving forces behind all human activities is derived from instincts. Why should not a system of habitual behaviour provide its own driving force towards the continuation of that habit system?

3. McDougall's Classification of Human Instincts

In his *Outline of Psychology*, McDougall distinguished fourteen human instincts, each of which showed one particular kind of goal-seeking behaviour and was accompanied by one characteristic primary emotion.¹⁷⁶ Later he abandoned the use of the word "instinct" for this purpose and substituted "propensity" for the driving force behind such innate behaviour tendencies, using "instinct" only for the combination of a single propensity with a single system of innate abilities, as is found in the lower animals but not in man.¹⁷⁹

In *The Energies of Men*, McDougall gave the following tentative list of human propensities: (1) food-seeking propensity, (2) disgust, (3) sex, (4) fear, (5) curiosity, (6) protective or parental, (7) gregarious, (8) self-assertive, (9) submissive, (10) anger, (11) appeal, (12) constructive, (13) acquisitive, (14) laughter, (15) comfort, (16) rest or sleep, (17) migratory, (18) a group of very simple propensities subserving bodily needs, such as coughing, sneezing, breathing, evacuation.

McDougall did not regard this as a final list, and suggested that under some of these headings more than one propensity may be included (number thirteen, for example, may include two propensities, one to acquire and one to hoard) and that some, such as number seventeen, may not be true human propensities. "But," he concludes, "in spite of these uncertainties and of differences of opinion among authorities, which require us to regard this list as subject to revision, there is no room for doubt that such inborn propensities are the very foundation of all our mental life, that they provide the driving forces, the hormic energies, manifested in all our activities from the simplest to the most complex."¹⁷⁹

It is clear that no change of opinion was implied by the merely verbal change made by McDougall from the word "instinct" to the word "propensity". In his later work he used "propensity" with exactly the same meaning as that previously attached to "instinct", for an innate driving force without any implication that the structure of the resulting behaviour was also innately determined. The change of terminology was merely to avoid the misunderstandings created by those to whom "instinct" did imply an innately structured pattern of behaviour. It is of some practical importance to avoid such misunderstanding, since psychologists cannot be indifferent to how their theories may react on opinion outside their laboratories. In popular thinking the use of the word "instinct" generally implies the idea of fixity and invariability of behaviour. The psychologist who maintains the existence of a human instinct of pugnacity may, for example, be misunderstood to be lending

support to such contentions as "Since man is born with an instinct of pugnacity there must always be wars". Such an argument implies not only the innateness of the driving force behind pugnacity but also the innateness and unchangeableness of the structure of the behaviour itself. If the substitution of the word "propensity" for "instinct" can save the psychologist from being so misunderstood, it is well that he should make the substitution.

More important than this merely verbal question are the problems of how far the listing and description of human instincts, or propensities, serves to promote the understanding of human behaviour and that of the truth of the proposition these alone provide the driving forces behind all our activities.

The study of the nature and variety of human propensities would clearly be of great importance to social psychology if the differences between societies could be shown to be dependent on the differences between the propensities of their members. For this dependence, there is little or no evidence. Societies differ enormously in the nature of the dominant incentives to which their members respond, people of one culture may be aggressive while a neighbouring people are peaceful and friendly, in one district they may be individually acquisitive while in another they are relatively communistic. Anthropologists and sociologists are, however, convinced that these variations are due to differences in the cultural histories and acquired social attitudes of the peoples concerned and not to differences in their innate equipment of propensities. That this is very commonly true is suggested strongly by the observation that a peaceful people may in a few generations be changed into a warlike one, as the Fijians²¹⁴, or a warlike people into a peaceful one, as the Maoris and Red Indians, by change of cultural conditions. Similarly, the acquisitive pattern of culture may be imposed on a primitive people by contact with capitalist civilisation. Innate propensities cannot change so quickly, and we must suppose that, with the same propensities, different social behaviour patterns are adopted as one or another propensity is reinforced or inhibited by social custom. If this is true, it means that, while human propensities may exist, they do not throw any light on social history comparable with the light thrown by the study of the action of such social forces as cultural patterns, social institutions, etc.

It may be objected that, at least, we know that some primitive societies are more resistant to change than others and that this may be explained by their propensities being not those required by the pattern of culture with which they are presented. In Kenya, for example, the Kikuyu seem ready to adopt our own acquisitive

pattern of culture, producing goods for sale and buying commodities with the money received, whereas the Masai seem indifferent to this system of incentives. This might be explained by supposing that the Masai were abnormally lacking in the acquisitive propensity. There may, however, be other explanations. It may be that the social traditions of the Masai are such that the attitudes acquired from early childhood make them resistant to our civilisation and to its recognised incentives. Until we have an independent method of measuring the innate factor in acquisitive behaviour, explanation in terms of an acquisitive propensity is merely speculative.

The same difficulty occurs in the explanation of the differences between individuals by the differences in their propensities. We know that some individuals are more aggressive than others and that some are more acquisitive. But are these differences in their propensities? They may be differences in attitudes, acquired perhaps in early childhood. Freud attributes to the experiences of early childhood many of the differences between individuals that others would attribute to instincts or propensities, and there is no scientific way of deciding between these possibilities.⁹⁷

Before discussing the truth of McDougall's proposition that the innate propensities alone provide the energy manifested in all human activities, it may be well to try to make clear to ourselves the meaning of such terms as "motive force" and "energy" in describing human behaviour.

When we use these terms in psychology, we are using an obvious and convenient analogy from physical science.* If a body previously at rest is set in motion, we attribute its new motion to the fact that it has drawn upon some external or internal source of energy. The speed with which it is set in motion depends not only on its mass but also on the energy supplied (the relationship is: $\text{energy} = \frac{1}{2}mv^2$). This energy is also shown by the difficulty of stopping the body when once set in motion.

We clearly need some analogous principle to explain variations of intensity in human activity. A man may be sitting idly when he

* It is sometimes said that this is not the case, because the meaning of "force" and "energy" was originally derived from man's mental experience and was only applied by analogy to the explanation of physical movement. This may have been true originally, but the physical meanings of "force" and "energy" have become so much now the standard ones, that in giving these terms psychological applications we are truly applying to behaviour a physical analogy, and it is necessary to remember that it is only an analogy. Undoubtedly an active man does use more physical energy, but this physical energy is not a measure of the psychological energy behind his activity. A man making responsible decisions under the stress of strong emotion may be expending physical energy at a lower rate than a navvy carrying out a habitual task.

perceives a dangerous object approaching him. He begins to run with great activity. His change from passivity to activity might be explained by saying that energy has been derived from his fear propensity. Similarly, he may be stirred to activity by hunger, or love, or anger. If he is strongly moved, his behaviour is intense and persistent. The energy or strength of motive force may be judged by the intensity of the induced activity or by the difficulty with which it is stopped by such external forces as obstacles or social prohibitions, or by such internal forces as opposing impulses or the man's own volition.

It is clear from the examples given above that innate propensities may be sources of energy. The statement that these are the only sources of energy seems, however, to be contradicted by so much evidence that it is indefensible. We have already seen that the strength of human sexual activities and fear activities is certainly determined by other factors than the strength of inborn propensities. If we mean by a source of energy anything that can produce activity, we must include the habit systems and attitudes as sources of energy.* A man may go each day for a walk after tea, or go each day to his work, simply because these activities belong to habit systems. His activity of going to church or to a political meeting may similarly be determined by his attitudes. Human volition must also be regarded as a source of energy. A man may engage in such an activity as going to visit the dentist because he has resolved to do so although his habits and propensities both impel him to stay at home.

It does not seem even to be true that a propensity always provides a greater driving force than any of the other possible sources of activity. Certainly there is, in general, a tendency for this to be true and we commonly expect behaviour directed by a propensity to be more persistent and more resistant to change than any other kind of behaviour. An animal will show greater resentment if its eating or mating are interfered with than it will show to most other kinds of interference, and interference with these impulses in mankind also usually meets with greater resistance than interference with a mere system of habits. Habit systems also, however, show strong resistance to change, particularly in the old. There is no reason for supposing that the strong motive force of habits is always due to these being based on strong propensities. The motive force behind the drinking of alcoholic beverages is

* The principle that a habit system may itself become a drive has been labelled by G. W. Allport the principle of *the functional autonomy of motives*.¹⁰ It is asserted, at least by implication, by every psychologist who has rejected McDougall's view that the innate propensities are the sole sources of energy.

certainly a strong one, and social prohibition of it in the United States met with strong resistance, but this is certainly not an innate propensity. There seems to be no sufficient reason for saying that all motive forces behind human activity come from the inborn propensities, nor even for the more moderate statement that such motive forces as come from innate propensities are necessarily the strongest ones.

To sum up, there seems to be no reason for denying the existence of human instincts or propensities if these are defined as innate motive forces behind behaviour. It seems better to avoid the word "instinct" in connection with human behaviour, since this word may lead to misunderstanding. On the other hand, it is doubtful whether the conception of human instincts or propensities is of much service in explaining differences between societies or between individuals, since it is not possible to determine how far these differences are innate and how far they are acquired. There seem to be strong reasons for rejecting the doctrine that the driving forces behind human behaviour are entirely derived from innate propensities.

4. Instinct and Emotion

Of the innate factors determining human behaviour, one of obvious importance is emotion. More will be said about emotion in Chap. V, for the present it is sufficient to indicate that emotions are the class of mental processes comprising anger, fear, shame, joy, etc. These have as their main common features (1) a characteristic element of *feeling*, or *affect*, (2) a tendency to initiate some characteristic type of behaviour (as striking in anger, running away in fear, etc.), (3) the fact that on the physiological side they are reactions involving the primitive *autonomic nervous system* and certain of the ductless, or *endocrine*, glands. In a certain sense there appears at first sight to be something odd about the fact that an organism may have such an innate constitution that when it is faced with a danger situation it has the experience of fear and not merely the impulse to do the right thing without any emotional accompaniment. If the organism had only an innate disposition in the presence of danger to run away as fast as its leg muscles could carry it, it might appear that it was adequately equipped against this danger, and that the further accompaniment of the emotion of fear (which, in fact, sometimes impedes the effective running away), was superfluous or dangerous. The solution of this problem is suggested by the observation that emotions loom into consciousness before the instinctive behaviour with which they are connected begins to be carried out, and again when it is in any way

impeded. During unimpeded instinctive activity, there is very little accompanying emotion.

The fact that emotion tends to well up during interference with behaviour suggests that the biological function of emotion is that of a driving force which leads the organism to adopt varying behaviour to attain some end. Thus anger precedes the behaviour of aggression and, if this behaviour succeeds in its object of injuring the person who roused the anger, the emotion tends to vanish. But if it is found impossible to attain this end, anger persists, leading the angry person to adopt other methods—abusive language, defamatory remarks to other persons, etc.—still directed towards the end of paining or humiliating the person who is the object of the anger.

Similarly, fear may drive us to run away and, while we are successfully keeping ahead of the danger, the emotion of fear becomes small. Then a brick wall impedes our progress, and the emotion again looms up, driving us to adopt other means for saving ourselves from danger—remaining still in concealment or responding with some acquired manipulative behaviour such as turning and firing a rifle. The effect of the emotion is to lead the person experiencing it to adopt varied means to attain an end, while a single invariable line of behaviour such as that of an automatic instinct would only be adequate to secure the end in the particular situation to which the instinct was adapted.

Thus there are two lines of development of behaviour. In such organisms as insects, we see a high development of automatic instincts. The organism is, on the whole, adapted to respond with stereotyped behaviour to accustomed situations. In the other line of development the organism, partly by the operation of its sympathetic nervous system, develops in response to external situations demanding activity, stresses not towards a particular line of behaviour but towards any kind of behaviour that will fulfil the requirements of the situation. These are the emotions. *Emotions are driving forces serving intelligent variable behaviour just as the automatic instinctive responses serve the needs of stereotyped behaviour.* The disposition to respond emotionally is itself inborn, it is the result of the inherited organisation of the central nervous system, the sympathetic nervous system, and the organs with which they are associated. We may conclude, then, that the emotional dispositions correspond in the intelligent organism to the automatic instincts in the other line of development.

To the question of whether man has instincts in the sense of the automatic, innate adaptive behaviour patterns of the insects, the answer is obviously that he has not. But there remains in

his psychological constitution something automatic, that is, his emotional dispositions. Although these have as their biological function the reinforcement of variable behaviour controlled by his will and intelligence, the emotions themselves retain a primitive automatic character.

5. Dynamic Conceptions of Human Behaviour

One of the motives which drove James and McDougall to their theories of human instincts was their perception of the sterility of an older method of dealing with the problems of human behaviour which treated man's behaviour as if it were merely a result of his thinking. This is the method of explanation of behaviour of which the most ambitious example is the associationist psychology whose manifest failure to help in the understanding of human behaviour discouraged further attempts at the development of a system of human psychology along similar lines.

On this matter most, perhaps all, modern psychologists would agree. This, however, is a general argument for a dynamic system of psychology, and not for a particular system of dynamic psychology. A dynamic psychology is one which treats the general directions (or tendencies) of man's behaviour, and the driving forces behind behaviour, as necessary explanatory principles for the science of human nature.

A dynamic psychology may be mechanistic or purposive. A mechanistic psychology, such as reflexology²² and the extremer forms of behaviourism²⁹⁸, conceives of human behaviour as determined by preceding causal sequences analogous with those of the physical world. A purposive psychology recognises another type of determination of behaviour by purposes or tendencies to seek goals. For example, the varying behaviour of a bird in carrying materials to its nest, weaving them into its structure, etc., may be attributed to the goal of constructing a nest for accommodating its eggs, and the behaviour of a man in buying a railway ticket may be attributed to the goal of reaching his destination. There is an obvious difficulty in such "teleological" explanations of behaviour in terms of goals that it seems to contradict the ordinarily accepted principle that a cause must precede or be contemporaneous with its effect. The goal which is treated as the cause of the behaviour is here later in time than the behaviour itself.

This difficulty may be got over in the case of human action by attributing it to a present "intention". We may say that the man has bought the railway ticket because he has the intention of travelling to a certain destination. The goal-seeking behaviour is thus

attributed to a cause, the intention, which is not later in time than the behaviour. If we are behaviourists, and therefore not able to attribute behaviour to a mental cause, we shall regard its cause as the physiological set which accompanies the intention. Can we similarly explain the goal-seeking behaviour of animal instincts by attributing them to intentions or the bodily concomitants of intentions? Obviously such an explanation is possible in those cases in which an animal carries out instinctive behaviour under conditions in which it could be supposed to have foresight of the end to be attained. The matter is, however, less easy when we consider such behaviour as that of the *Cerambyx* grub (page 21), whose behaviour is adapted to ends which the insect cannot be supposed to foresee since it can have had no experience of them. Its position when pupating, for example, is adapted to the fact that when it becomes a beetle it will no longer have a flexible body, while the protective door is adapted to protection from outside enemies. Yet the pupa has had no previous experience either of the bodily structure of the adult beetle or of the outside enemies against which the pupa needs protection. Its behaviour looks as if it were determined by a future unknown situation and not by anything which can correspond to a present intention.

The difficulty could be got over in this case also by adopting Loeb's theory of *chain-reflexes*¹⁷⁰. This is the theory that such a sequence of behaviour is a succession of reflexes, each of which produces the stimulus for the performance of the next. For example, the instinctive behaviour of a toad in catching a fly may be explained on this theory as a chain of reflexes each of which leads to a situation which is the stimulus for the occurrence of the next reflex. The visual stimulus of the fly produces the reflex response of the darting out of the toad's tongue; if successful, this produces the contact of the fly with the inside of the toad's mouth, which is a stimulus producing the reflex closing of the mouth which produces the stimulus which leads to the reflex action of swallowing. So the series of responses, darting out of tongue, closing of mouth, and swallowing, are regarded as a chain of reflexes each caused by the preceding one, and there seems to be no need to postulate the final goal of swallowing the fly as the cause of the behaviour that leads to it.

This explanation in terms of chain reflexes is, however, only plausible if it is applied to an invariable sequence of reflex elements of behaviour. It breaks down when we turn to the more typical kind of instinctive behaviour in which the sequence of behaviour elements is very variable, but the one common feature of all the sequences is that they lead to the same end. We may take as

an example the undoubtedly instinctive nest-building behaviour of birds. There is no single reflex response which the bird exhibits when it has a straw or twig in its mouth. It may make one or another set of muscular movements according to the state of completion of the nest. Its movements seem to be determined not by any preceding stimulus but by the aim of completing a nest of the kind customary to its species.

The same objection really applies also to the explanation in terms of chain reflexes of the behaviour of the toad swallowing a fly. When we say that the visual stimulus of a fly produces a reflex darting-out of the toad's tongue we are assuming a simplicity of this part of the toad's behaviour which is not justified. The stimulation of the toad's retina by the fly does not occupy some particular tract in the optic nerve which is connected as a reflex arc with the tongue muscles. The response may be called out when the fly is in different positions or at different distances, so that different parts of the retina must be stimulated and the stimulations conveyed by different tracts in the optic nerve. Also, whatever tract conveys the sensory impulse might have been stimulated by some other object and have called out no such response. If the object, for example, had been a bee and the toad had previously been stung, an avoidance reaction would have been produced, although the same system of nerve fibres might have been stimulated as by the fly.¹⁵ So that if we picture the toad's response to the fly as due to a reflex arc we must postulate not one nerve tract connected with the tongue but many thousands. Thus the simplicity of this element of behaviour disappears on closer examination. Here also there is variety in the behaviour chain leading to one single goal, that of the swallowing of the fly. Here, too, the explanation of the behaviour must be in terms of the goal to be attained.

6. Behaviour Tendencies and Drives

When James and McDougall explained human behaviour in terms of "instincts" or "propensities", they were making use of a dynamic concept to cover the purposive facts of behaviour. Both terms imply, however, that the behaviour systems referred to are innately determined. We may decide that we cannot make much use of these conceptions in human psychology because of the impossibility of knowing how much of what determines any human behaviour system is innate. We are then left with the necessity of finding equivalent dynamic terms which have not that implication.

We find that human behaviour tends to be organised in systems which pursue different ends. A young man may spend eight hours

of the day earning his living with breaks during which he eats, afterwards playing golf for an hour, and then going for a walk with the woman whom he intends to marry. The activities which serve the ends of acquisition, of nutrition, of recreation, and of sex have all called out his activity. With different degrees of certainty we suspect that an innate propensity underlies some at least of these, although some may in no sense be innately determined but entirely results of acquired sentiments or attitudes. We may use the term *tendency* for them all, admitting that some tendencies are, at least in part, determined by innate propensities.

It will not be doubted that some tendencies are more directly innately determined than others. The behaviour of running away from danger, or of hitting with the fists in anger, is obviously more primitive than shooting with a rifle at the dangerous object or relieving anger by making a sarcastic remark. To such primitive and relatively unlearned responses we may give the name *instinctive tendencies*, while recognising that in the adult even responses of this kind have not escaped the influence of acquired factors.

We need also a term for the energy behind a tendency and may conveniently adopt the term *drive*, now very generally used. The use of the term "drive" implies that the organism behaves as if impelled towards a certain goal, it implies nothing about the actual means of such impulsion, which may be physiological, *e.g.* an internal secretion. It is also, of course, not implied that the energy of the drive is necessarily the result of the inborn constitution of the organism, on the contrary, it may, in part at least, be the result of what has happened to the organism during the course of its life.

An emotion may be regarded as the effect on the organism of the system of stresses which accompany the activity of a drive. We have seen that an emotion is a process in time varying in intensity and in affective character with the changing relationship of the organism to the situation to which the emotion is a response. The nature of the stress when a drive is active is generally changing during the course of the behaviour to which it gives rise. In escaping from danger, an intense and painful stress is set up before action starts and when it is stopped, while the pleasurable relief from stress accompanies successful carrying out of the behaviour of escape.

Two conditions must generally be fulfilled in order that a behaviour response may occur, there must be an appropriate external stimulus or situation (the incentive) and an internal tendency to react (the drive). A female rat, for example, will not at all times retrieve young rats and bring them into a nest. Usually

she will only do so after giving birth to young. This may be expressed by saying that she will not retrieve young except when the retrieving drive is active. If the drive is active, she will generally not show this behaviour in the absence of the incentive of young rats lying outside the nest. If the drive is very strong, however (the first day or two after birth), Wiesner has found that she shows retrieving behaviour even in the absence of the normal eliciting situation of young rats outside the nest.¹¹ At this time, he has found that she will retrieve a young rabbit, a young chick, and even her own mate. A few days later, when the drive is less strong, it can only be elicited by young rats outside the nest, and, since the incentive value of smaller young ones is greater than that of larger ones, Wiesner has been able to devise an ingenious method of showing the decline in strength of the drive in the successive days after the birth by the fact that smaller and smaller baby rats must be used in order to elicit the reaction.

Similarly, a man may be in an angry frame of mind when a very small annoyance can call out an aggressive response; he may, on the other hand, be in a placid state of mind when an aggressive response can only be called out by a great annoyance. The occurrence of a response depends, therefore, both on strength of incentive and strength of drive. In some cases a drive may be so strong as to produce the response without the presence of the appropriate incentive.* Thus a man in a very angry state of mind may become violent without any external cause just as the mating reaction in some animals, e.g. frogs, may be attempted in the absence of any possible mate.

Drives obviously differ amongst themselves in the extent to which an external incentive is necessary for the behaviour of the drive to appear. Food-seeking behaviour, for example, takes place when hunger starts, without any external stimulation. It is not entirely independent of the presence of food, since the perception of attractive food may arouse the behaviour when the drive is still too weak to arouse it without that stimulation, although not when the strength of drive is at its minimum, as immediately after a heavy meal. Tendencies which depend primarily on internal rhythm of drive strength for their appearance are generally called *appetites*.

It should be clear that there is no sharp line between appetites and non-appetitive tendencies. Many tendencies which would not

* We cannot, of course, assert the opposite proposition that an incentive may be so strong that it calls out a reaction in the complete absence of a drive, since we have no way of determining the presence or absence of drive except by the occurrence or non-occurrence of the corresponding reaction.

ordinarily be called "appetites" are more or less dependent for their functioning on an internal rhythm of drive strength. We have already seen that sex and maternal drives may function without the normal external incentive, and may thus be regarded as partly appetitive. Thus all tendencies may be regarded as lying somewhere on the line we may draw between the two extremes of the pure appetite, whose activity is entirely dependent on the internal factor of drive strength and independent of external stimulation, and the purely non-appetitive tendency with constant drive strength whose activity is determined by the presence of the appropriate outside stimulus. Hunger and thirst are obviously near the pure appetite end of this scale, whereas the tendency to the fear response is nearer to the other end of the scale.

The conception of drive is a psychological one based on observation of behaviour. We naturally ask how far a drive can be physiologically explained. If a drive shows periodic variation in strength, *i.e.* is more or less appetitive, we may hope to find a physiological process, such as a secretion, whose intensity of activity is correlated with the strength of drive. Thus Wiesner has shown that the retrieving behaviour of rats is conditioned by a secretion from the anterior lobe of the pituitary gland, which is an endocrine (*i.e.* ductless) gland situated in the lower part of the brain.³⁰⁴ This is shown by the fact that this behaviour can be produced in a virgin rat by injection of an extract of the pituitary gland secretion. Similar observations have been made for other components of maternal behaviour and for sexual behaviour. Thus the rise and wane of the strength of drive in these behavioural tendencies appears to be correlated with greater or lesser amounts of an endocrine secretion. The activation of the behaviour tendency must be supposed to be due physiologically to interaction between the endocrine secretion and some neural mechanism.

In the appetites of hunger and thirst, the corresponding physiological determinants of strength of drive appear not to be endocrine secretions but local conditions of the stomach and throat respectively. A nearly empty stomach contracts at fairly regular intervals, for about half a minute at first. During this contraction, pangs of hunger are felt and there is an impulsion to restless seeking for food, which we may call the *craving* for food. Of the conditions which determine this contraction, the most important is the concentration of blood-sugar, the stomach contraction, and the consequent food craving, disappearing when this concentration increases above a certain amount. The ultimate determinant of the food-seeking tendency appears thus also to be a chemical change in the blood.

The hunger pangs and the craving for food may both be abolished by any method of preventing the stomach contractions, such as smoking strong tobacco or pulling a belt tightly round the waist. Similarly, thirst and the corresponding craving for water are produced when the mouth is dry. Normally this occurs as a result of reduced activity of the salivary gland when insufficient water has been taken, but may be caused by breathing dry air and temporarily relieved by washing out the mouth with water without drinking.

7. The Concept of Valences

Another way of approaching the problem of giving an explanation of behaviour in dynamic terms is that adopted by the Gestalt psychologists. Many objects have an immediate psychological effect on a man's behaviour, some attract him to eating, grasping, or climbing, while others repel him. His behaviour may be attributed to the existence of forces existing between the man himself and these objects of his environment. It is obvious, of course, that these forces do not belong as physical forces to the objects themselves, so we must make Koffka's distinction between the external physical objects of a man's geographical environment and the objects as they exist for his perception and feeling—the objects of his *behavioural* environment, and attribute these forces to the behavioural objects.¹⁵² These imperative influences on behaviour by the objects of a man's behavioural environment have been called by Lewin the *valences* of the objects¹⁶⁶ ("valence" is the generally accepted English translation of Lewin's *ausserforderungscharakter*—literally "demand character"). We cannot correctly describe the behavioural environment of a man without including the valences of the objects by which he is surrounded—the character of this object as desirable food, of that as a weapon, and of another as a danger to be avoided.

The use of the term "valence" implies nothing about the innateness of this property of behavioural objects. Some valences are probably inborn, loud sounds seem clearly to belong to the class of behavioural objects with innate negative valences. The negative valences of snakes may be acquired. It is clear that there is an intermediate possibility that there may be an innate predisposition to the formation of certain valences, which will not be formed unless the individual happens to have the experiences necessary to lead to their acquirement but which will nevertheless be more easily acquired in this way than other valences. A negative valence, for example, may perhaps more easily become attached to snakes than

to rabbits Which of these possibilities is true of any particular valence can only be discovered by experimental enquiry

Koffka has criticised McDougall's conception of a propensity as a source of energy, on the ground that it gives an incomplete account of the dynamics of activity,^{15,2} and preferred the explanation in terms of forces between the person acting and the behavioural object This criticism if valid, would obviously apply equally to any energy theory and not only to a theory of innate sources of energy The *valence* hypothesis is, however, in no sense an alternative to an *energy* hypothesis, it is an answer to a different question If we ask what force drives a motor car forward, the answer is that it is the reaction of the road surface to the rotation of the wheels If, on the other hand, we ask what is the source of energy for the car's motion, the answer is that it is the combustion of petrol in its engine The first is analogous to the question which Koffka was trying to answer, the second to that which McDougall was trying to answer The answer to the second question is necessary if we are to explain why the car moves at all, although a fuller account of the dynamics of the motion requires also the first answer

CHAPTER IV

ACQUIRED PATTERNS OF BEHAVIOUR

1 Variability of Instinctive Behaviour

The simplest organisms live under remarkably uniform conditions, so that, on the whole, uniform responses to situations are those which best serve for their survival. This would appear to be the biological ground for the comparative rigidity of their instincts. But even the simplest organisms are liable to meet with unusual situations, and the rigidity which serves them so well in a humdrum natural existence will be unserviceable or even dangerous as a mode of dealing with a novel element in the environment. Successful dealing with such unusual environmental demands can only follow from a modification of the ordinarily rigid instinctive behaviour. What, in fact, does happen to animals' instincts when they are faced by such problems? This is a vital question for the beginning of our study of intelligence.

The answer to this question can be obtained by observation and experiment. We find that what happens under such conditions depends both on the organism observed and on the extent of the disturbance made in its customary conditions. Sometimes the result of modifying the conditions under which an animal carries out an instinctive course of behaviour is failure of the animal to modify its conduct, with the result that its instinct ceases to be serviceable under the new conditions. Sometimes, however, the animal responds by a new course of behaviour, adapted to the new conditions, which is apparently as innate and as little dependent on a thought-out appreciation of the position as is its more usual behaviour.

We may first find an example of a failure to adapt conduct to a new situation in Fabre's much-quoted observation of the result of interfering with the routine of a *Sphex*⁸⁰. This wasp, before dragging her prey into the nest prepared for it, would always leave it just outside the nest while she went inside, returning an instant later and pulling the paralysed caterpillar in. When Fabre pulled the caterpillar some distance away from the hole, the wasp repeated this ritual, again leaving the caterpillar just outside, and again finding it pulled away when she came out. Most of the *Sphex* were willing to repeat this an indefinite number of times, never making the simple modification of behaviour necessary to pull the caterpillar straight into the hole.

But this great exponent of rigidity in instinctive behaviour noticed that even insects did not always fail to make useful modifications of conduct in face of new conditions. He found, for example, that a certain *Sphex* refused to be duped by the drawing of her prey from the mouth of the hole when she was inside, but dealt with the situation very effectively by pulling the caterpillar directly into the nest instead of repeating the ritual of a preliminary descent alone. The few insects which show such adaptability are, he says, "the revolutionaries", and he regarded them as exceptions.

But even the researches of Fabre himself lead us to the conclusion that adaptability is not so rare amongst insects that it can be ignored in giving an account of their instincts. He took two dozen nests of the bee *Osmia* from a quarry where they had been nesting for centuries in shells, and placed them in his study with some hollow stalks and hollow shells. When the bees came out in the spring, nearly all selected the stalks to nest in as the better suited to their purpose. Indeed, such variability of response to different situations must often be regarded as an innate part of the system of the instinct. Fabre observed, for example, that the blue-bottle fly laying its eggs on a dead linnet would choose its mouth as the best spot for depositing them⁸¹. If the mouth, however, was closed tightly, she would lay in the eye, if the head was enclosed in a paper bag, she laid in the bird's wounds, if the head was enclosed and the bird unwounded but plucked, she laid a few eggs only in the cavity of the axilla and the crease where the thigh joins the belly. Only if the head was covered and the bird unwounded and unplucked was she completely frustrated and no eggs were laid.

As we ascend the animal scale the modifiability of instinctive behaviour becomes greater. Two instances described by Pike may be taken of spontaneous modification of instinctive behaviour in birds²¹⁸. The moor-hen usually builds its nest of grass and reed stems, but this observer noted that on a piece of water where these were absent, the birds constructed their home of wood, with just a small lining of grass. Some linnets also, deprived of their usual nesting-places, showed a simple and effective adaptation to their new conditions. These had nested for years in small canopies of fir branches which were placed on the ground to attract wild ducks. When these were done away with, they continued to nest on their old haunts, and since there were no small bushes there, such as the birds generally nest in, they took to the grass and built their nests a few inches above the ground.

The common feature of all the above examples is that they are instances of an instinctive response whose usual form is frustrated

by some unusual element in the situation. Instead of showing a mechanical rigidity, and consequent failure to deal with the novel situation, the instinct shows itself capable of expression in an unusual mode of behaviour better adapted to the particular situation of the organism. Sometimes, indeed, a modification in instinctive behaviour is found when there is no novel element in the environment to call it out. Such is the familiar observation of the Peckhams of one specimen of *A. urnaria* which modified the behaviour of her species so far as to smooth the earth about her completed nest with a small pebble she had picked up as an instrument better adapted for this purpose than her feet²¹³.

Such instances of instinct modification as these may be called *spontaneous instinct modifications*, in order to distinguish them from those modifications of behaviour which take place as a result of learning or intelligent insight. There seems no reason for supposing that such modifications of behaviour as we have been describing need for their explanation either thought or the utilisation of past experience. They are manifestations of that plasticity of instinctive behaviour which is an element in it no less innate and original than is its approximately rigid pattern.

When the conditions of an organism are invariable, rigid pattern reactions are all that it needs for effective dealing with its environment. As its environment becomes more liable to change, its innate pattern reactions must become more plastic. Finally we come to such environmental conditions as those of civilised human life, in which variations in demand on behaviour are so constant and complex that mechanical innate behaviour patterns would have no survival value, and plasticity of behaviour resulting in complex, discriminative, and graded responses becomes almost an invariable rule. The instincts survive only as a framework on which such variable and complex behaviour is built.

We will close this section by a description of an experiment by Fabre on the modifiability of behaviour of the burying beetle when the ordinary instinctive response of burying a carcase on the spot where it is found has been thwarted by placing it on a piece of ground in which the insect finds itself unable to dig⁸¹.

Fabre placed the body of a mouse on a brick lightly covered with sand, but with deep earth all round, so that the mouse could not be buried on the spot where it was lying but could be buried anywhere near it, and he observed the behaviour of several burying beetles. His object was to discover whether the beetles would remove the carcase to a more suitable place when they discovered the unsuitability of its situation. Other observers had given

accounts of the burying beetle's behaviour under similar circumstances, which suggested such plasticity in the insect's conduct as would make it necessary to attribute to it intelligence of a high order. He found that a very long time (no less than two hours) was wasted in attempts to bury the mouse on the spot, with much ineffectual, and mutually opposed, heaving of the body. Then some of the beetles left the body and made borings in different parts of the surrounding earth. Although all were in the deep earth, five of these trial borings were abandoned and the sixth was apparently selected. The beetles returned to the body of the mouse, and it was heaved to the site of the sixth boring and was there buried in the ordinary way six hours after the beginning of the experiment and four after the recognition of the impossibility of the first spot.

We must recognise two things in the course of conduct described by Fabre: adaptability of behaviour to the new situation, and a peculiar clumsiness in the adaptation. Faced with the same situation, a party of men could not have done more than to shift the object to be buried to a better situation and to bury it there. They would not, however, have taken so long to make the change. Certainly they would not have spent two hours trying to dig through the brick. The whole process would have been shortened by a much more rapid learning from experience and by some of the overt actions of the beetles being replaced by processes of thought. If it is agreed (page 32) that adaptive variability of response is intelligence, there is no need to ask whether the beetles' actions were intelligent. Obviously their behaviour showed adaptive variability and therefore intelligence, but equally obviously it was intelligence of a very low grade.

2. Modification of Behaviour by Learning

It is to be noted in the above account that the behaviour of the burying beetle is not merely the production of another response from its repertoire by the demands of a new situation. Instead, a line of action was abandoned because it failed to attain its end, and a different line of action was substituted which was more effective in attaining that end. The behaviour of the beetles was modified by the experience of failure. They seemed, in fact, to show some capacity for learning.

This capacity for learning is a striking characteristic of the living organism. Its actions and the results of those actions modify its future behaviour. If a billiard ball is hit skilfully so that it makes a cannon and leaves the other balls well placed, it will have suffered no modification of its structure that will make it in any way more likely that, from the same starting point, it will follow

the same path again. But such modifications are continually met with in animal behaviour. The dog that has once caught a rat in a stable will look for rats when he returns there, or if he has been hurt by the kick of a horse he will be unwilling to bark near the hind legs of horses in the future. The animal's behaviour undergoes continual modification as a result of the events of its life. This process of behaviour modification is called *learning*.

Much of the early experimental investigation of learning was made by means of animals, and the first tendency was to attribute the power of learning to the operation of a few somewhat mechanical laws. Later research has shown that learning is a very much more complicated process than was at first supposed, and that the so-called "laws of learning" do not give a full account of the process of learning when we get beyond the artificially simplified conditions of the earliest animal learning experiments. The laws in question are the *Law of Exercise*, the *Law of Effect*, and the law of *Conditioned Reflex* formation. Each of these laws accounts for something but not everything of the ways in which some acquired patterns of behaviour are produced.

3. The Law of Exercise

This law states that the carrying out of an action or of a system of actions facilitates its subsequent performance. The negative aspect of this law, sometimes called the *law of disuse*, is that failure to carry out an action or system of actions over a sufficient length of time reduces their tendency to reappearance. There are two subsidiary laws: the *law of frequency*, which states that such exercise is more effective the more frequently it is carried out, and the *law of recency*, which states that, other things being equal, exercise is more effective the greater its recency.

Where learning is taking place by exercise, the effect of this exercise is found to be cumulative. Such constantly repeated activities as shaving, or performing the motions for opening a door, have been performed so often that they take place with the minimum of conscious control. Such more or less automatic acquired behaviour patterns are called *habits*.

The cumulative effect of frequent repetitions is also found when what is acquired is a verbal habit, as in learning by heart. We are inclined to say that a passage has been "learned" when it can be repeated without error. Experiment shows, however, that repetitions beyond this point increase facilitation of the response, and such further repetitions are called "overlearning." An overlearned activity is more automatic and more permanently retained than one that has just been learned. The ordinary arithmetical additive

operations, for example, are during our school days very heavily overlearned, and for their subsequent usefulness it is very necessary that they should be

If we think of learning through exercise as a mechanical result of a law that repetition of an activity necessarily facilitates later occurrences of the same activity, an obvious physiological explanation of the process suggests itself. This is the explanation expressed by William James in the words "A path once traversed by a nerve-current might be expected to follow the law of most other paths we know and to be scooped out and made more permeable than before" ¹³³

Modern statements of this theory are more specific as to which part of the neural tract might change. We know that in a single neurone conduction takes place in any direction, and there is no mechanism by which facilitation or blockage of a nerve current could take place inside the neurone. The action is therefore transferred to the point of junction between two neurones, the *synapse*, which is supposed to impose the unidirectional property on nerve impulses, and which might be capable of facilitating or blocking impulses. If the above explanation had been written now "decrease of resistance at synapses" would have been substituted for "the scooping out of a neural path". Obviously this substitution does not make any essential difference to the principle.

The objection to this explanation is that it is too simple to fit the complexity of the facts to be explained. If the problem of learning were simply to explain how a single muscular response to a simple sensory stimulus was more easily repeated on a second repetition of the same stimulus, the explanation might be adequate. We find, however, in fact, that in a learned response, just as in an unlearned one, a certain pattern of stimulation irrespective of the particular end-organs stimulated, gives rise to a certain pattern of response attaining a single end by the use of one or another set of muscular movements. In such a learned response there can be no part of the path of nervous conduction common to all the circuits between receptor and effector systems, so that facilitation or lowering of synaptic resistances is of no value to explain the fact of learning.

The experimental facts of animal learning also cannot be explained in terms of conduction along a special system of nerve tracts. A rat, for example, is trained to react positively to a white triangle on a black background ⁸⁵. What now will be his reaction to a black triangle on a white background? On the hypothesis that learning depends on facilitation of nervous impulses along certain tracts, this should be a totally different system of stimulation, since

now the parts of the retina are stimulated which were not stimulated before and the parts of the retina which were stimulated before are not stimulated now. The rat, in fact, reacts to the black triangle in the way he has been trained to for the white one, even though he has also been trained to react negatively to a white circle on a black ground, which is, so far as stimulation of retinal areas goes, more nearly equivalent to the white triangle.

What is to be explained in learning is not the facilitation of some single movement, as is assumed in such theories as that of the scooping out of nerve pathways through use or the lowering of synaptic resistance. The fact to be explained is the organisation together of a group of movements. A set of movements previously performed in other groupings becomes integrated as a unitary behaviour system. Once such a unitary system has been formed it tends to appear as a whole when the appropriate situation for its appearance arises. Independent control of the separate elements of the system is very largely lost when it is thus integrated. Thus a skilled activity such as serving at lawn-tennis or any habitual activity such as walking or sitting down, if it has originally been learned with superfluous or undesirable elements, cannot without great difficulty be freed from these.

There is no doubt that exercise does result in the facilitation of the groups of behaviour elements that have been exercised together, there is less reason for supposing, as the customary statement of the Law of Exercise seems to imply, that there is an automatic tendency for exercise to have this effect. Experiment shows that exercise may have the effect of facilitating the subsequent performance of the set of activities practised, or that it may have very little effect, or even the effect of reducing the likelihood of the subsequent appearance of the activity practised. This plainly does not look like an automatic tendency for an activity repeatedly exercised to reappear more easily afterwards.

First, we may notice a case where mere exercise of an activity seems to be ineffective in animal learning. Thorndike pointed out that whereas animals learn a new activity by doing it themselves they do not seem to learn it by someone holding and moving their limbs.²⁷¹ If we wish to teach a dog to beg, we hold up a piece of food so that he himself gets into the required position, attempts to teach him by putting him in the required position are relatively ineffective. What apparently has to be exercised for learning to take place is not the mere muscular movements but these movements accompanied by the intention of carrying them out.

Similarly, in human learning by heart a very large number of purely passive repetitions will be less effective than a much smaller

number in which, after each, there is an active attempt to recall what has just been read. This was Ebbinghaus's learning method in his famous experiments on nonsense syllables⁷⁴. Also, it is found in human learning that the intention of learning is essential to the effective action of the law of exercise. An enormous number of passive repetitions without the intention of learning, such, for example, as are provided in an experiment on distraction, may result in no appreciable learning. This plainly indicates that there is no automatic improvement of the learning by mere repetition and gives further reason for distrusting any explanation of learning by exercise as analogous to the automatic wearing of a path by use.

This conclusion is more strongly enforced when we consider the cases in which exercise has the opposite effect of making behaviour less likely to reappear. Knight Dunlap has drawn attention to the facts of what he calls *negative practice*¹⁵⁰. He found that when he found himself forming the habit of mis-spelling a word in typing, the most effective way of breaking the habit was to force himself to go on repeatedly typing the word out in its mis-spelled form, and that this exercise eliminated the mis-spelling far more effectively than the orthodox method of repeating the right spelling. He has found also that, in some cases, this negative practice is an effective way of getting rid of such undesirable habit systems as speech defects and spasmodic facial movements (tics). The essential condition for negative practice to be effective appears to be that the repetition shall be made with the intention of eliminating the habit. So we must conclude that it is not mere repetition of a behaviour system that is effective for the learning of it; the mental attitude is also a determining influence. Different mental attitudes may cause repetition to have the opposite effect of suppressing learning, or may cause it to have no appreciable effect one way or the other.

4. The Law of Effect

This is the law which has been put forward to explain learning by *trial and error*, in which various kinds of behaviour are tried out by the animal which ultimately learns to use those behaviour patterns which are successful in attaining the end aimed at and to avoid those which are unsuccessful. An example of learning of this kind is to be found in Lloyd Morgan's observations on young chicks¹⁹⁷. These began by picking at all small objects, but in two days a young chick had learned to pick out pieces of yolk from pieces of white of egg. When the observer mixed pieces of orange peel with the egg these were at first picked up, but their unpleasant

taste made the chicks quickly reject them, and they were not afterwards seized. Thus the behaviour of seizing and swallowing fragments good for eating was implanted, while similar seizing and swallowing of unpleasant fragments was inhibited.

The classical example of trial and error learning is Thorndike's set of experiments with cats enclosed in puzzle boxes from which they had to release themselves by clawing at a string or lever in order to get food.²⁷¹ He maintained that the animals made at first many useless and apparently random movements, one of which in the end would by chance be the action required for release. In future confinements, the law of effect made it slightly more probable that this successful action would be repeated, so it tended to come earlier in the system of random movements. Finally, all other movements were eliminated and the releasing movement appeared alone, but the gradualness of the improvement suggested that there had simply been a progressive mechanical elimination of unsuccessful movements and no sudden seeing into the situation such as a human being might show in similar circumstances.

The *Law of Effect* which has been formulated to cover such learning may be stated as follows: *if the carrying out of an action is successful (in attaining the end aimed at) the subsequent repetition of that action is facilitated, if unsuccessful, its repetition tends to be inhibited.* This law is sometimes expressed in a form in which the causative agents are the pleasure resulting from success and the displeasure resulting from failure, but it is preferable to state the law in terms of what can be actually observed (*i.e.* the success and the failure). As stated above, the law mentions only the observable facts and leaves open the question of whether the facilitation and inhibition is a result of pleasure and displeasure, or whether it is an effect of the mere success and failure apart from any feeling about them.

Trial and error learning, as described by Thorndike, is entirely mechanical. The successful action originally appears accidentally as one of a repertory of possible movements and has not been produced because of its appropriateness to the situation. Its subsequent facilitation is also mechanical and is the inevitable result of a tendency for success to make the action leading to it more likely to reappear. It is not the result of any kind of understanding by the animal tested of the connection between its release and the action that led to it. The alternative explanation of such animal learning is that the essential step in the learning is ability of the animal to see how the puzzle box works. Such seeing through the problem is called *insight*. If learning takes place by insight, the role of the trials and the errors may be a wholly different one.

from that postulated in Thorndike's theory. It may not be to lead to any mechanical "stamping-in" of successful lines of behaviour but simply be a kind of exploratory activity which leads to a rudimentary kind of understanding of the way the mechanism works.

Thorndike himself regarded his results as valid only for animals at or below the evolutionary level of the cats he experimented with, and produced evidence that monkeys learned by another method. This was shown by the fact that their learning curves showed a sudden drop to complete solution, such as would be shown when a human subject saw through the problem, instead of the slow decline of the learning curve of the cats.

Thorndike's followers have not, however, always been so cautious, and the law of effect has been regarded as a fundamental law of learning which can be extended to human learning if we postulate only that man carries out trial and error in thought processes and not merely in explicit behaviour. Experimental evidence is, however, strongly against the legitimacy of any such extension of the blind and mechanical operation of the law of effect postulated by Thorndike to learning at the human level, and gives grave reason for doubting whether such blind learning is characteristic of any animal, even of Thorndike's own cats.

In an illuminating series of experiments with chimpanzees, Professor Kohler demonstrated that these animals did not learn by a blind process of trial and error but by attaining insight into the nature of the problem, although this power of insight was severely limited by the complexity of the problem^{1,2,3}. For example, bananas were hung from the roof out of an ape's reach and a box was left on the floor which would enable the animal to reach the bananas if he moved it under them and climbed on to it. The chimpanzee might do nothing about the box or he might smash it up in rage, but he never moved it at random until by accident the bananas were within reach. When he moved it, he pulled it straight under the bananas. The walking towards the box, moving it under the bananas, climbing up, and fetching them down, all appeared suddenly as a single system of behaviour. It was a particularly striking fact that, in cases where this insight was not attained, mere trial and error did not lead to learning. The chimpanzees, for example, sometimes had the problem of piling boxes on the top of each other in order to reach the bananas. They never, however, mastered the problem of so piling the boxes as to make a stable structure, and after reaching a certain height the pile of boxes always fell down. Although they carried out this activity assiduously for two years, they showed no improvement, although if there

were a law that successful lines of behaviour were automatically stamped in and unsuccessful ones eliminated they ought to have shown steady improvement. Mere trial and error without insight did not seem to lead to learning.

This finding does not, of course, in itself invalidate the conclusions of Thorndike, since he himself thought that a higher type of learning than trial and error was possible to apes. There are, however, indications within Thorndike's own experiments which suggest that the cats were learning less blindly than he supposed. First, it was pointed out by Köffka that some of the curves of learning of Thorndike's cats showed the sudden drop characteristic of insightful learning instead of the gradual improvement which Thorndike regarded as evidence for blind learning¹⁵¹. Secondly, Thorndike made the significant observation that if he opened the box when the cat licked itself, the cat learned to lick himself to get the box opened, but that, whereas the ordinary behaviour of opening the box by pulling a string or pressing down a latch became progressively more vigorous as the learning progressed, the act of licking became more perfunctory and finally degenerated into a mere ritual lick as if the cat distinguished between behaviour that really opened the box and behaviour which led the experimenter to open the box. Plainly, on the theory of blind stamping in of successful activities, there should have been no such distinction. Thirdly, if the process is one of stamping in the successful response, the final learned response should always be the set of muscular movements which was used in the process of learning. This does not appear to have been the case with Thorndike's cats, and when this question has been specifically studied by other investigators (*e.g.* Hobhouse¹²², D. K. Adams¹, and McDougall¹⁷⁶), the opposite has been found. McDougall, for example, studying the trial and error learning of a dog, reported that it "never repeated a fixed habitual series of movements, but with widely varying movements always achieved the same end".

Finally, it was suggested by Köhler that the general tendency to blind learning displayed by Thorndike's cats was not an essential characteristic of animal learning but one imposed by his experimental set-up¹⁵³. The essential connections of the mechanism, *e.g.* between string and latch, were generally concealed from the cat so that the animal had no opportunity of gaining insight into the nature of the mechanism even if it were capable of doing so. Human beings also, if they have to solve such a problem without any opportunity of seeing how the mechanism works, learn by a blind process of trial and error. If one wants to know whether

cats eliminate unsuccessful movements by a blind process or by attaining insight into the conditions of success an experimental situation should be provided in which either method of learning is possible

This was done by D K Adams, who also worked with cats but obtained altogether different results from those of Thorndike¹ He found that random responses, as described by Thorndike were only shown by the cats when in an excited condition and did not lead to learning If the cats were outside the puzzle box and the food was inside (obviously a much more favourable condition for observation) much of the cat's behaviour might have no relationship to the problem at all (it might be wandering round the room), but such activity would in a confined cat be interpreted as random behaviour directed towards getting out He found that when the cat did interest itself in the box the solution appeared suddenly as a unitary piece of behaviour just as described for chimpanzees by Kohler

The kind of explanation of insight which can be given from the point of view of Gestalt psychology, which was the system of thought in which this concept was first used, is as follows The animal which has learned that he can get out of a puzzle box by pulling a cord or to reach bananas on the roof by placing a box under them has experienced a reorganisation of its perceptual field The cord or box, which were previously a relatively neutral part of the perceptual field, are now seen in a new way as means to the end of escape or acquiring food It is the bringing of them into this new relation to the end towards which effort is directed that is the essential characteristic of insight and that is the essential step in insightful learning

The great value of Thorndike's work was that it started experimental study of animal learning in place of the old anecdotes of the cleverness of animals Yet the main thesis of Thorndike's work must be regarded as one of the blind alleys of psychological research Learning appears not to result from random successes being stamped in by the mechanical operation of the law of effect Later studies of animal learning by Tolman and others have confirmed the view that the processes involved are much more complex than they appeared to Thorndike²⁸⁷ The attempts made by some educational psychologists to reduce human learning to the mechanical laws of exercise and effect are strongly to be condemned They tend to lead to drill rather than to explanation as educational methods, and to treat the purpose of the educational process as remembering where it should be understanding

5. The Conditioned Reflex

Another principle of acquired behaviour is that based on the experiments made by the Russian physiologist Pavlov on conditioned reflexes.²¹⁰ When food is presented to a dog, its salivary glands begin to secrete. This he called an *unconditioned reflex*. If now a bell is rung several times at the same time as food is presented to it, it is found at the end that the secretion of saliva will take place when the bell is rung without the presentation of food at all. The mere ringing of the bell is now sufficient stimulus to cause the secretion of saliva. This he called a *conditioned reflex*. Salivary secretion has become conditioned to the new stimulus of the bell.

The essential principle underlying the formation of conditioned reflexes is one that will be familiar to anyone with even a slight acquaintance with the history of psychology. It is the principle of *association by contiguity in time* which was one of the fundamental laws of association of ideas. The formula for association by contiguity in time was that if the ideas of the objects *A* and *B* had frequently occurred to a person's mind simultaneously or successively (through his seeing the objects simultaneously or successively) then the idea of *A* would in the future call up the idea of *B*. If in this formula we substitute for "*idea of A*" the words "*the stimulus A*" and for "*idea of B*" the words "*reflex response to B*" we get the formula for the conditioned reflex. If, therefore, we follow the more extreme behaviourists in making the conditioned reflex the explanation of all acquired modes of behaviour, we have a picture of human conduct which is extraordinarily like that given by the associationists. It is unfortunate that this relationship should have been obscured by the general adoption of the term "*conditioned reflex*" instead of the term "*association-reflex*" which was proposed and used by Bechterev.²²

It would, however, be unjust to Pavlov's work to suggest that it is merely a rediscovery of the principles of the associationist psychology. There is certainly no novelty in the general principle and still less in its speculative application as the single explanatory principle of all acquired behaviour, animal and human. That simply gives an associationist psychology in a new terminology, open to all the objections to the old associationism.

Pavlov's discovery of the conditioned reflex was essentially the rediscovery of association by contiguity, but it was also a good deal more. In the first place, it was a great gain that the principle was clearly stated to hold between elements of behaviour and not merely between ideas. Many of the things found out about conditioned reflexes, moreover, were entirely new—facts about the inhibition

of conditioned reflexes, their dependence on the cerebral cortex, and so on

The conditioned reflex has sometimes been treated as the general principle underlying all acquired behaviour both animal and human. This, however, involves an extension of the term "reflex" beyond its accepted meaning of a simple response depending on conduction along a specific nervous tract. Some human acquired behaviour is reflex, as, for example, the physiological aspect of the emotions, and towards the understanding of acquired emotional responses the principles discovered in connection with conditioned reflexes are valuable. Much more, however, of human acquired behaviour is in no sense reflex. We shall, for example, get no further in understanding how a child learns mathematics by treating this as a system of conditioned reflexes to number stimuli. Generally the problem of acquired skills and intellectual development lie outside the field covered by the conception of the conditioned reflex.

The extension of the concept of the conditioned reflex to fields in psychology where it does not belong has been more a result of the over-enthusiasm of Pavlov's followers than of Pavlov's own teaching. He himself said "at the present stage of our work no detailed application of its results to man is yet permissible". He, however, went on to say "It is obvious that the different kinds of habits, based on training, education and discipline of any sort are nothing but a long chain of conditioned reflexes"²¹⁰. It is not quite clear whether this passage is intended to imply that the results of training, education, and discipline, are merely the formation of habits which are chains of conditioned reflexes, or simply that the formation of habits is part of the result of these influences and that this part is equivalent to the formation of a chain of conditioned reflexes. The first proposition must certainly be rejected, even the second is open to grave doubt since there seems to be good reason for supposing that that law of conditioning of reflexes is not the sole law of habit formation.

6. Some Problems of Human Learning

Problems of human learning are in many respects different from those of animal learning. The greater variability of human behaviour and the fact that language may be used for the purpose of modifying behaviour introduce obvious differences from the learning even of the most advanced sub-human vertebrates. Too close attention to experiments on animal learning in forming a basis for a theory of human learning tends to make the principles of human learning too mechanical and to divert attention from

the wide range of possible methods of human learning. A good deal of what is popularly supposed to be the teaching of "psychology" on methods of inducing desirable habits in infancy suffers from an over-mechanical view of the infant, and harm may be done to the emotional development of young children by the following of methods alleged to be based on "psychology".

The young mother may, for example, be taught in the name of "psychology" that she must on no account go to her child when he cries in bed. The reason given is (in accordance with the law of effect) that if the cry is successful in obtaining the presence of the parent this behaviour will tend to be repeated. Thus the child can only be taught not to cry by finding that the attempt to obtain the parent's presence is not successful. It must not be forgotten, however, that the law of exercise is also to be considered, and the fact that the child goes on crying the first time will, other things being equal, make it more likely that he will develop a habit system of crying in bed. More serious is the consideration, made clear by the work of the child psycho-analysts, that the child may be crying because he is suffering from anxiety¹⁴⁹. If that anxiety is relieved by the presence of the parent, the child is less likely to form a habit system of crying than if the anxiety is left unallayed, which also may have other bad effects. This does not, of course, mean that a sound psychological principle will lead the mother always to go to her child when he cries, but there is no psychological principle that can be rigidly applied to relieve her of the necessity for using her judgment as to whether the crying is due to a fear which should be relieved or is motivated by an attempt to control her actions which may safely be ignored.

The system of reward and punishment seems also to be based on a general acceptance of the basic principles of the Law of Effect. Crime, for example, leads to imprisonment, which is not only unpleasurable but also thwarts the ends for which the crime was committed. Imprisonment may thus be expected to have the effect of stamping out criminal lines of behaviour. Socially recognised methods of enriching oneself, on the other hand, lead to success in this aim and to the other rewards of a respectable life. So such lines of conduct should be stamped in.

That this method is not completely successful may be partly due to the fact that failure and punishment are not sufficiently certain rewards of crime. For successful stamping out of criminal systems of behaviour by the principle of effect, it is not necessary that punishment should be severe but it is necessary that it should be certain, whereas in fact the habitual criminal may be more successful than his honest neighbour. It is also probably due in part to

the fact that the psychological situation is more complicated than that of Thorndike's cats. Punishment may lead to an emotional habit system of rebellion against society which stimulates further criminal activity, as well as strengthening social bonds with other criminals.

Punishment and reward in schools seem to be similarly founded on a popular belief in the effectiveness of pleasure as a method of stamping in bonds and of the much greater effectiveness of unpleasure as a method of destroying bonds. Punishment is a thoroughly bad teaching method because it may have undesirable secondary consequences. A child caned for making mistakes in spelling may not, as the teacher hopes, simply learn to avoid those mistakes in future. We know that experimentally an avoidance reaction may spread over many similar or contiguous things besides the one immediately associated with the painful experience that caused it. The child may show consequent aversion to all spelling, correct as well as incorrect, and even to all book learning. Similarly a baby smacked for dirtying its napkin may, as a result, have a neurotic difficulty in excretion under all conditions and not only in the special condition against which the smacking was directed.

Punishment is older than the enunciation of the law of effect. Its use is due to a popular recognition of the truth underlying that law, and to a lack of recognition of other psychological principles which may interfere with its effectiveness. So far from the practice of punishment being a result of experimental psychology, the influence of psychologists has in general been against the current dependence on punishment and reward, particularly in schools.

The most general statement of what is meant by learning is that it is the acquisition by an individual of some new piece of behaviour new to him. What is acquired may be

- (1) a bodily skill such as skating or a new tennis service,
- (2) a new system of verbal habits as in learning by heart,
- (3) a new intellectual skill such as the ability to solve quadratic equations, *or*
- (4) a new emotional habit such as that of being afraid of motor traffic

Learning is taking place during the whole of life, particularly in childhood, without any necessity of an intention on the part of the subject himself or of anyone else that learning should take place. The new pieces of behaviour learned may be desirable or undesirable. There is also a controlled and intended process of learning which is directed towards the acquisition of what are regarded as desirable new pieces of behaviour. This is education.

The educator wishes to learn from psychology what are the most effective methods of inducing learning

Let us for the moment leave on one side the first and the last of the above objects of learning and consider only the problem of learning by heart and acquiring a new intellectual skill. The first of these is the one which comes nearest to being merely a process of habit acquisition, and therefore most easily directed by the more mechanical laws of learning derived from animal psychology. The danger of applying a too-mechanical view of learning is that the first of these may be regarded as typical of learning. The task of the educator then tends to be thought of as merely to encourage remembering where what is required is understanding. His method is likely to become that of drill rather than of clarification.

Learning by heart forms a part of every educational system, although it is now generally agreed that it should be a small part. The part played in such learning by the law of exercise is generally recognised by the use of repetition as the basic method of learning. Other things being equal, the permanence of the remembering depends on the number of repetitions. A piece of material is sometimes said to be "learned" when the number of repetitions is sufficient for a single correct repetition, but this clearly is not the end of the process, since further repetitions are found to increase the time during which the material learned is retained, it is then said to be *overlearned*.

Mere repetition is, however, not enough, effective motivation is necessary for efficient learning. A very large number of repetitions made passively without the intention to learn prove to be ineffective as compared with a relatively small number made with effort to learn. Understanding also plays a part in learning by heart in all cases except the simplified situation of learning nonsense syllables, used by Ebbinghaus for the early experiments on memory,⁷⁴ a very much smaller number of repetitions is necessary for learning by heart a passage of meaningful material understood by the subject than for an equal length of meaningless material.

An obvious difference between human and animal learning is the extent to which the human subject may learn by being told or shown what to do. Thorndike maintained as a result of his experiments with cats that these animals could not learn by being "put through" a task or by seeing it performed by the experimenter,²⁷ the experimenter must create a situation in which the cats perform the required task for themselves in order that they may learn it. Kohler, however, found that an intelligent chimpanzee could profit by seeing an action carried out by the experimenter.¹⁵³ A door which the ape needed for climbing to food fastened on the roof

was fastened back by means of a hook passing through a ring. The chimpanzee was unable to open the door. "Finally, the animal gave up, but he watched me attentively when I approached the door, lifted the hook, and turned the door a little. At this moment he gave a cry of surprise, and I hardly had re-established the connection of hook and ring when the ape was already at my side, opened the hook, turned the door towards the food, and solved the problem."

This way of learning, exceptional among animals, is common amongst human beings, and a large part of education consists in children being told or shown what they should do in order that they may learn to do it themselves. No reasonable system of education could give up the advantages of using such instructional methods to provide a quicker substitute for learning like Thorndike's cats by doing things oneself. Yet efficiency in learning may be sacrificed by too exclusive reliance on instruction, children learn better and remember longer what has been acquired by self-directed activity. When Ebbinghaus experimented on the learning of nonsense syllables by heart, his method was the active one of reading them over and then trying to repeat them.⁷¹ This is a more arduous method of learning by heart than the passive method of merely repeated reading over of the material to be learned, but it is considerably more efficient.

This superiority of an active method is more obvious when the task is not that of learning by heart but of acquiring a new intellectual skill. Here the task is to attain understanding, and not merely to remember. The attainment of insight by a process of trial and error may be much more effective than mere explanation by the teacher. The function of the teacher is to provide the situation in which the trial and error activity takes place and to supplement the process of discovery by explanation when this is needed. So in modern systems of education such activities as problem solving and map drawing may replace the memorisation of formulae and place names. Similarly, the student wishing to teach himself statistical methods will work out problems for himself and not hope to learn the methods by the relatively uneconomical way of merely reading explanations in a textbook.

In the use of trial and error as a means of gaining insight, there is an important difference between animal and human learning. In the human being much of the overt behaviour of the learning animal may be replaced by trial and error carried out in thought processes. It is sometimes an advantage in learning actually to do the thing to be learned, but there is great economy of effort in replacing the doing by thinking, where this can be done.

7. Inheritability of Learned Behaviour

In the early days of psychological speculation, there seemed no special difficulty in supposing that instincts were modes of behaviour which had been adopted by successive generations of animals and had therefore been inherited by their descendants. The evolutionary development of instinct has been supposed to be closely analogous with the process of habit formation in the individual. Just as a skilled craftsman has carried out an action so often that it is accurately performed with little or no consciousness of the details of the muscular action, so, it was suggested, an instinctive action was one which had become automatic and innate through repetition by successive generations.

In other words, it could be supposed that the instinctive equipment of any animal was its inheritance of the learned behaviour of its remote ancestors. This view was argued by Samuel Butler in opposition to the currently accepted Darwinian ideas on the subject.⁴⁷ There is nothing inherently absurd in the idea, but there is a considerable lack of evidence for its truth. If it were true, it would obviously have important practical implications for educational and social psychology. If acquired mental achievements were inherited, we should not be starting afresh in the teaching of each successive generation of children at school. The possible intellectual achievements of a child would be dependent not only on his own innate ability and on what he learned at school or at home but also on the inherited effects of the education of his parents. Education in successive generations would thus be a process with cumulative effects. So also would the effects of the social conditions under which people lived. Racial improvement could follow amelioration of social conditions, whereas if acquired characters are not inherited, racial improvement can only result from natural or artificial selection of the fittest to be the parents of the new generation.

The problem of the evolutionary origin of innate behaviour tendencies is similar to the biological problem of the origin of inherited physical structures. The view that what is acquired by individuals may be inborn in their descendants is commonly known as the Lamarckian hypothesis.¹⁵⁸ At the present day the Darwinian hypothesis is generally accepted by biologists. On this view, species show inheritable random variations of physical structure and of behaviour tendency, and those variations serviceable to survival are retained as inheritable characters simply because those individuals which possess them are most likely to survive in the "struggle for existence" and are thus most likely to have descendants. This

hypothesis does not require the Lamarckian assumption of *the inheritance of acquired characters*

There are two principal reasons for this preference for the Darwinian hypothesis. First, since Weismann stated the principle of the *continuity of the germ plasm*,¹⁹⁰ it has seemed difficult to account for the inheritance of acquired characters. Such inheritance would require that a structural or behaviour change occurring during the lifetime of an animal would so modify its germ cells as to cause a tendency for the same change to appear in its offspring. It is very difficult to conceive of any mechanism by which such a modification could take place. Secondly, the large amount of experimental work designed to discover whether any instances of inheritance of acquired characters can be produced experimentally has generally shown negative results.

Yet the case against the Lamarckian hypothesis is not conclusive. Scientific conclusions drawn from the limits of what we can conceive are notoriously uncertain. Positive results of experiments on the inheritance of acquired physical characters have also been claimed, although these are few. The principal are those of Kammerer¹⁴⁵. Other biologists have, however, not been satisfied by Kammerer's experiments.¹⁹¹

The results of experiments on the inheritance of acquired behaviour tendencies have also been mostly negative. Rats trained in a maze were found to show no inherited effects of training. Pavlov claimed to have demonstrated the inheritance of a food-seeking conditioned reflex in mice, but this claim was afterwards withdrawn.

Experimental evidence of inherited results of training was, however, reported by McDougall^{177,178}. He contended that if Lamarckian inheritance took place, it would not be of those changes which have happened fortuitously to the animal, such as cutting off its tail, but of those that are results of its conscious efforts towards an end. He found that when rats were trained through successive generations to swim to the more dimly lighted of two exits from a tank of water, their offspring were more easily trained in the same performance.

Some of McDougall's results do not appear to be significant when critically examined, but the improvement of successive generations of rats trained in the tank is clearly significant. It does not, however, follow that this improvement was due to inheritance of the learned behaviour of the rats' ancestors. Crew has repeated McDougall's experiments and found no difference at the end of eighteen generations between his experimental group of rats and the control group of rats bred from untrained parents.⁵⁸

McDougall's positive results may have been due to some process of unwitting selection of the quickest learning rats for breeding. Such selection might take place in many ways: by the tendency of the experimenter to select from a litter the most active young for future breeding, by lowering of the fertility rate of the slowest learners by the number of severe electric shocks they must experience in the course of training, or by a possible tendency for the quickest learners to thrive best in the climate and conditions of the experimental laboratory. The improvement may alternatively have been due to improved handling of the rats by the experimenters in the later parts of the experiments. Since McDougall neglected to take the essential precaution of working throughout with a control group of rats doing the same experiments and differing from the experimental rats only in the fact that their parents had not been trained, it was impossible for him to distinguish between a real inheritance of the effects of training and alternative explanations of the improvement of successive generations.

McDougall's experiment has now been repeated at Melbourne University^a with a control group of rats with untrained parents. The experimenters found, like McDougall, that the experimental rats improved in their performance in successive generations. This, however, could not be attributed to their trained ancestry since a parallel improvement was found in the control group. It is true that the improvement was greater in the rats with trained ancestors at one stage of the experiment, but this difference disappeared by about the thirty-second generation. By the end of the experiment, genetic differences appeared between the experimental and control rats (in colour pattern and body size), so that they were no longer of the same genetic constitution and, even if a difference in performance had persisted, this might have been due to an accidental genetic difference and not to the inherited effects of training.

It is, therefore, not possible to accept the result of McDougall's experiment as evidence for any inherited effect of training. For the present, it must be assumed that in the process of human education we start afresh with each new generation. There are no experimental grounds for the hope that the fact that children are the offspring of educated parents gives them a genetic benefit predisposing them to more rapid learning.

CHAPTER V

THE EMOTIONS

1. Emotion

It has already been pointed out that one of the inherited parts of man's psycho-physical make-up is his disposition to experience certain emotions in certain classes of situation and to display the characteristic type of behaviour which accompanies them. There are a variety of such emotional responses, to which we give the names "fear", "anger", "wonder", "grief", etc.

The dominant element in the state of mind of a person under the influence of emotion is *affect* or *feeling*. The name "emotion" is usually only used of an affective condition associated with some object or situation. If this association is absent, we use some other name for the condition. *Moods*, for example, are feeling-states more prolonged than emotions, less connected with any external object or situation, and with less impulsion to any course of behaviour. We may use the name *affective state* as a generic term for all such conditions in which the feeling element plays a large part.

It is necessary to notice that in ordinary speech we speak of "fear", "anger", "love", etc., as if these were names for distinct states of mind distinguishable by their quality as feeling. I do not think that this is the case. The different emotional names are given to the feeling-states we experience in different practical situations, the feeling-states themselves may vary more in the course of any one situation than they differ amongst themselves. Thus, as feelings, the states of mind we experience when we say we are angry and when we say we are afraid may not be very different. * We distinguish them because in the one case we find ourselves fighting and in the other case preparing to run away. Nor could we perhaps distinguish introspectively the unpleasant feeling of rejected love and of unsatisfied hunger. The emotional names are determined by the different practical situations in which occur feeling-states themselves not sharply distinguished.

A single emotional name is given to a succession of feeling-states which vary very widely amongst themselves. An emotion is a

* This must be borne in mind when we consider what weight to attach to the argument against the James-Lange theory that different affective states may have very similar visceral accompaniments (see § 6)

process in time, not an instantaneous state of mind. If we are attacked by a dangerous animal, during the course of behaviour which ends by our putting a fence between ourselves and the animal we are likely to have experienced many varieties of affect from a tense and highly unpleasant one at the beginning to a relaxed and pleasurable one at the end. Yet all of this is commonly expressed by saying that we felt "fear". It is clear that this one word "fear" may cover greater differences of affective state within itself than may exist between two emotional conditions described by different names.

This consideration should make us unwilling to draw any conclusions from a method of treating emotional names as if they stood for different and distinguishable entities. For example, McDougall says that a single instinct (or propensity) can be distinguished by the fact that it has associated with it "one kind of emotional excitement whose quality is specific or peculiar to it"¹⁷. The truth would appear rather to be that, for practical reasons, a name is given to the emotional processes that accompany behaviour directed towards a single goal although there may be little that is specific or peculiar about the affective aspect of these processes.

McDougall calls the specific emotional states belonging to single instinctive tendencies the "primary emotions", and regards other "secondary" emotions as blends of these. Admiration is thus regarded as a secondary emotion compounded of the primary emotions of wonder and negative self-feeling, as purple is a secondary colour compounded of the primary colours red and blue. This distinction between primary and secondary emotions implies necessarily that the primary emotions are different and distinguishable entities. If we accept the view that has been suggested above of an emotion as a process in time containing many varieties of affect not peculiar to it, there seems to be no ground for making this assumption or for accepting the distinction between primary and secondary emotions, which depends on it. It seems likely indeed that much that has been accepted as a descriptive psychology of the emotions is really no more than a study of the implications of the peculiarities of the naming of emotions in our language.

One of the essential characteristics of emotion is that it is a state of mind which includes not only an affective element but also a *conation* or impulse to behaviour. This impulse to action is associated with the affect in such a way that the affect becomes stronger if the impulse is not obeyed, but is dissipated if the behaviour dictated by the impulse is carried out. Thus the strong and somewhat unpleasant affect belonging to the emotion of anger

is associated with an impulse to the violent behaviour of attacking the person who has produced the anger. If, as is ordinarily the case in civilised society, this mode of behaviour cannot be carried out, some relief to the affect is obtained by violent abuse of the person. If neither of these modes of behaviour can be carried out the affect becomes unpleasantly strong. A certain amount of relief can, however, be obtained by the creation of a mental phantasy of the injury or degradation of the person who was the object of anger, or by violent behaviour which is not directed against this person. This directing of emotional behaviour in some other direction than that of its true object has been called *displacement of affect*. It is also to be observed in such responses as that of a child whose tenderness is aroused by the sight of another child, and expresses itself not by kissing the other child but by kissing its own mother.

2. The Sympathetic and the Disinterested Emotions

An emotion is generally the response of a person to the situation in which he finds himself—fear to his own danger, anger to his own injury, and so on. But these same emotions may be called out as responses to two other kinds of situation, both related to other people. First, we may experience the emotion of fear when we hear the scream of a frightened person, or anger when we hear a friend's voice raised angrily and see his threatening gestures towards some person who has injured him. Here the situation calling out our emotion is the outward expression of some other person's similar emotion. The emotion called out in this way may be called *sympathetically induced emotion*, or, more shortly, *sympathetic emotion*.

We may, however, also experience emotion as a consequence of the perception of a situation affecting another person. We may feel fear when we see another person on the point of being run down by a bus which he has not seen, or when we watch a child playing at the edge of a cliff unconscious of its own danger. Similarly, we may feel anger at an injurious or insulting speech about another person which he has not himself heard. Emotion called out in this way on behalf of another person may be called *disinterested emotion*.

It should be clear that we are here dealing with two different kinds of situation in which emotion and its accompanying impulse to behaviour may be called out in a situation primarily affecting not ourselves but other people. It is true that both kinds of situation may arise at the same time, as when we both see another person's danger and hear his cries of distress. This is perhaps

why they are commonly confused. They may, nevertheless, act independently, and either alone may be sufficient to produce emotion and its accompanying behaviour impulses. They are two different tendencies to emotion arising in different situations. If it is desired to use a generic term which will include both tendencies to emotion, they may be called *altruistic emotions*.

The altruistic emotions are of obvious importance in social behaviour. Of the two classes of altruistic emotion, sympathetic emotion appears to be the more widespread in the animal kingdom. Indeed, it is probably a very important part of the mechanism by which simultaneous activity in the same direction is secured amongst social animals. Bees engaged in attacking behaviour produce a higher note in their buzz, which appears to be a stimulus to attacking behaviour by other members of the hive. The snarl of an angry dog and the yap of a hunting dog appear to serve the purpose of stimulating other dogs to the same emotional excitement and to the same behaviour.

It is mainly in situations where a large number of people are gathered together in a crowd that the sympathetic induction of emotions has importance in the social life of human beings. When people are gathered together in close physical contiguity, the conditions are such that the expression of an emotion by some individuals has the maximum opportunity of being sympathetically induced in others. Since those in whom emotion is induced will by their own cries and gestures induce it in others and reinforce it in those who already share it, crowd emotions can attain a very high intensity and can produce activities of fear or ferocity or jubilation more intense and more intolerant of the barriers of ordinarily accepted prohibitions than any of which the members of the crowd would be individually capable. Thus we give the name "panic" to the intense fear and uncontrollable reaction of escape produced in a crowd by such reinforcement through sympathetic induction.

Disinterested emotion seems to be less common amongst animals than sympathetic emotion. Disinterested emotion is, however, also found amongst animals. Hunters report angry behaviour of baboons and oxen when one of their number is injured or threatened, which appears to be a response to the situation of the animal injured or threatened and not to its expression of emotion.²⁴⁵ In any case, it is a familiar fact that disinterested emotion may be shown by animals when they are engaged in parental activities. A mother cat will ferociously attack a dog (which under normal conditions she would run from) if he approaches her kittens, even when these are too young to show any emotional response themselves.

Apart, however, from parental behaviour, disinterested emotion seems to be relatively rare amongst animals. Kohler observed that if one chimpanzee was distressed by isolation from its fellows, these were little affected by its situation^{1,3}. Occasionally its cries of distress would induce another chimpanzee to embrace it through the bars, but the actual cries were essential for this behaviour to appear. Similarly, we may notice amongst dogs a general tendency to respond to emotional expression by other dogs but relative indifference to what is happening to these other dogs if they do not react vocally.

Amongst human beings, on the other hand, disinterested emotion is of considerable importance as a motive of a large part of the activity of every individual on behalf of other persons. As amongst the other animals, it is strongest as a response organised in the parental and the sexual systems of behaviour. A timid mother whose child falls into the water jumps in herself without any volitional effort and pulls it out because the impulse of disinterested fear called out by the danger of her child is prepotent over her own individual fear.

In non-reproductive social relationships, disinterested emotion is still present as a motive to behaviour. The moralist may deplore that it is a very much less strong motive force than individual emotion and that it often is not an effective motive under conditions in which it is desirable that it should be effective. We should, however, be misunderstanding the sources of social human behaviour if we ignored it. Its existence as a potential motive is known by those whose practical business it is to influence human conduct. Appeals for subscriptions to charities, propaganda for warlike action on behalf of the oppressed and maltreated inhabitants of an invaded country, all assume that this potentiality exists and may be made active by suitable methods of representing the sufferings to be relieved. Their success proves that the assumption is correct. We can be stirred emotionally by the dangers and sufferings of other people without witnessing their actual expressions of emotions, although, of course, far less strongly than by our own dangers and sufferings or by those of our families.

The effectiveness of disinterested emotion is obviously determined by the individual's group affiliations. He feels disinterested emotion most strongly on behalf of members of any group to which he himself belongs. He may be less distressed by the death of a million persons through a flood in China than by the drowning of ten persons in his own village.

Class grouping as well as local grouping is a factor in determining the strength of disinterested emotion. An individual may be

much more moved emotionally by the misfortunes of members of his own occupational group suffering persecution in a foreign country than by the distresses of those of his own country of a different social class from his own

Sympathetic emotion seems, on the other hand, to be less limited by group affiliations. The hearing of a scream of fear seems to arouse immediately the fear response whether or not the person screaming is closely linked to us by race, class, etc

3. Weakness of Disinterested Emotions called out by Mental Representation

While the disinterested emotions are called out readily in the actual presence of other persons in distress, they are called out much less readily and less strongly by the mere thought of the distress of others. This is only one example of the general truth that all emotional responses appear much more readily to actual situations than to imaginal representations of those situations. The case of the disinterested emotions is, however, of particular importance, for it produces a serious practical problem in modern social conditions.

Society is at present so organised that our decisions and actions frequently have great effects on the happiness or unhappiness of other persons whom we cannot see. The decision of a group of employers about wages, of a municipal authority about the evacuation of houses, or of the electors of one country about the steps to be taken for the recovery of debt from another, may have grave consequences in the happiness or unhappiness of the persons affected by the decision. These consequences may even be the misery and starvation of a large number of persons. Yet the persons making the decision are likely to feel disinterested emotion only very weakly on behalf of those affected by it, for the latter are too remote to call up vivid disinterested emotion. Similarly, our contributions to charities and relief funds would be given readily if we could actually see the sufferings we relieve, and appeals for these causes often try to make the sufferings as vivid as they can by striking pictures or by vivid description.

To this failure of the disinterested emotions to respond readily to merely imaginal representation is due much of what is commonly attributed to heartlessness and cruelty in modern social relationships. It is probably not true that we are more heartless or less easily influenced by disinterested emotions than our forefathers, but we live under conditions in which these emotions have less chance of beneficent action for the relief of suffering. The business

man who practices and defends "hardness" in his actions with respect to his employees^{*} would often not hesitate to give generously to one of them if he actually visited his home and saw his need

The disinterested emotions, like the other emotions, were originally responses to actually present situations, and our mental constitutions have not changed in such a way as to adapt us to a changed condition of society in which our responses to imagined situations may be of much more practical importance than our responses to actually present situations

It is true that there is a limit to the amount of such sensitiveness that would be possible for a person who is continually making responsible decisions which affect the happiness of other persons. Life would be intolerable for the business manager who felt himself all the misery which his decisions to cut down the number of his employees would cause, nor could one be a general who felt sympathetically the pain of all the bereavements caused by his decision to order an advance[†]

On the other hand, such evils as that of a great part of the population of a prosperous community living under conditions of ugliness, squalor, and need, would be more quickly put right if people generally felt disinterested repugnance against these evils strongly enough to take active steps to remove them. There would be fewer wars if all nations could be free from the influence of enthusiastic militarists whose power of feeling disinterested emotion to imagined situations is too weak to produce adequate emotional reactions to the miseries which wars produce

4. The Expression of the Emotions

There are three kinds of bodily response in an emotional reaction. These are (1) the behaviour associated with the emotion, such as striking in anger, running away in fear, etc., (2) other responses in the muscular system, particularly in the facial muscles, such as trembling, sneering, scowling, etc., with certain vocal responses (snarling, screaming, etc.), and (3) changes in the blood supply and viscera, *e.g.* pallor and excretion in fear

^{*} This hardness was rationalised at the beginnings of the industrial era by the economic doctrine that one best served the interests of others by pursuing one's own interest. In this manner Whately defended the action of the corn dealers who raised the price of corn in time of scarcity

[†] The fact that this failure of the disinterested emotions to come into play in the relationship between the employer and employed is unavoidable in large organisations does not alter the fact that it may have serious social consequences. A large body of men under a management which, by its very nature, must be unfeeling in its relationship with them, are in an ideal situation for the formation of hate sentiments against this management

The second group forms the important class of what are known as the *expressions of the emotions*. Darwin maintained that some of the facial movements were relics of movements which in time past would have been serviceable to the animal executing them.⁶¹ Thus the movement of sneering is the baring of the canine teeth preparatory to attack, and the turning down of the corners of the mouth in disgust is a relic of the facial movements which would have been made to get rid of food of unpleasant taste. These methods of expression he called *serviceable associated habits*. Other expressions he explained by a principle of antithesis. The cringing attitude in submission is, for example, the result of a relaxation of the muscles which are contracted in the upright gait of assertiveness. Thirdly, he noticed some expressions, such as the trembling of fear, which seemed to have no evolutionary value. These he considered served no purpose but were due to the direct action of the nervous system, *i.e.* to the spreading of nervous excitation.

Amongst ourselves observation of facial expression plays a considerable part in the intercommunication of emotion. This is probably unimportant in other animals than the Primates, since their faces appear less mobile under emotional changes and are very commonly covered with hair or feathers. Many experiments have been performed showing the ability of human subjects to recognise emotions from photographs. Many of these photographs have, however, been of people not actually experiencing emotion but trying to "register" emotion for the purpose of being photographed. Power of recognising such expressions may, therefore, be different from the power of recognising true emotional facial expressions, and be merely the capacity for understanding a conventional set of symbols for emotion which has been adopted for the purposes of the theatre and the cinema screen.

It must be remembered, too, that it is a convention amongst most civilised (and many uncivilised) men to inhibit the expression of the emotions both vocally and facially. We learn, therefore, to recognise emotions by the facial and other changes which accompany this inhibition. We may know, for example, that a friend is angry, not because he shows the primitive emotional expressions of a scowl, a raised voice, and angry gestures, but because we see that he is inhibiting these reactions by a slight smile accompanied by a good deal of muscular tension, an unusually soft voice, and general bodily stillness. Unless our experience has taught us to recognise these symptoms of inhibition of emotional expression as signs of emotion, we shall be peculiarly insensitive to what is being felt by those around us.

5. The Physiological Mechanism of the Emotions

On its physiological side an emotion is a system of reflexes set in action by a part of the nervous system called the *autonomic system*. In such invertebrate animals as the insects there is no central control of bodily movement by any organs corresponding to the vertebrate brain and spinal cord. There is instead a system of nerve centres or ganglia which are found at intervals along the length of the body. Bodily co-ordination is achieved not by centralised control but by nerve interconnections between these ganglia. This more primitive arrangement of the nervous system is found also amongst the vertebrates, and the interconnected system of the ganglia of the autonomic nervous system control such parts of the bodily mechanism as the beating of the heart, the contractions of the blood vessels controlling the supply of the blood to the skin, the movements of the unstriated (involuntary) muscles such as are found in the viscera, and the processes of digestion, defecation, and urination. Some of these processes, such as breathing, defecation, and urination, are also partly under voluntary control, others such as the heart-beat and the process of digestion, are entirely automatic.

The action of the autonomic nervous system on these automatic bodily functions is partly direct, partly mediated through secretions from the ductless or endocrine glands such as the thyroid gland in the throat, the pituitary gland in the head, and the suprarenal glands above the kidneys. These glands secrete substances into the blood stream which induce changes in the blood supply and other bodily processes which are under autonomic control. Thus Cannon showed⁴⁸ that in fear and rage the suprarenal glands secrete adrenalin into the blood stream, which has a number of effects on the body, some at least of which can be regarded as biologically useful changes in the organism, to prepare it for activity to meet the dangerous situation. For example, it causes the liver to release glycogen into the blood stream, thus rendering available increased energy for muscular activity, and both the contraction of the skin arterioles reducing blood supply to the skin and the effect of adrenalin in increasing the rate of blood-clotting reduce the danger of loss of blood through laceration of the skin.

The brain centre controlling emotional behaviour responses appears to be an organ of the mid brain known as the *optic thalamus*. The upper brain or *cerebrum* seems to inhibit the activity of the thalamus, since excessive emotional response may be the result of cutting off the connection between cerebrum and cortex. The control of emotionality which is an accompaniment

of growing up may be regarded as a progressive dominance of the cerebral over the thalamic control of behaviour

It is by no means certain that these bodily accompaniments of fear and rage are necessarily consequences of secretion of adrenalin. Later research suggests that they may be due to the direct action of the autonomic nervous system on the blood vessels etc. It seems clear, however, that some emotional conditions are directly conditioned by secretion of a hormone from a ductless gland. Wiesner has shown that injection into a female rat's blood stream of certain extracts from secretions of the anterior lobe of the pituitary gland produces the maternal behaviour of retrieving young.³⁰⁴ In other words, this injection produces a result in behaviour of a similar kind to that produced by tender emotion in the human mother. It is very probable that the physiological accompaniment of this tender emotion is such a pituitary secretion and that this secretion is the physiological source of the energy of the maternal drive. It is also very likely that the experience of sexual emotion is the psychological accompaniment of a similar glandular secretion.

6. The James-Lange Theory of the Emotions

William James¹³³ and a Swedish physiologist named Lange¹⁵⁹ put forward at about the same time theories of the nature of emotion, which, although not identical, were sufficiently alike to be generally treated as one theory under the name of the *James-Lange Theory of the Emotions*. The bodily changes mentioned in the last paragraph have always been noted as accompaniments to emotion, and its intimate connection with the viscera is suggested by many phrases which attribute love to the heart and sorrow to the bowels. Descartes⁶⁷ said that certain emotions were caused partly in the viscera and not merely in the brain.*

Now, there are certainly affector nerve fibres by means of which we can have sensations derived from changes taking place in the viscera and in the circulation of the blood. The essence of the James-Lange theory was that this set of sensations from visceral and vasomotor changes was the emotion.

James stated this theory sometimes in terms which were open to obvious criticism. He spoke, for example, of the visceral changes *causing* the emotions, and said that we do not cry because we are sorry, we feel sorry because we cry. Less open to obvious objections, however, was his more considered statement that "the bodily

* "the cause of them [love, hate, desire, joy, and sadness] is not, as is the case with wonder, in the brain alone, but also in the heart, the spleen, the liver, and in all other parts of the body, in so far as they serve in the production of the blood, and thereby of the spirits" (Art. XCVI)

changes follow directly the perception of an exciting fact, and that our feeling of the same changes as they occur is the emotion" The principal evidence brought forward by James in favour of this statement was that if we think away all the bodily accompaniments of an emotion there is no emotional content left at all

The James-Lange hypothesis has the merit that it is easy to devise tests of its truth or falsity If emotion is the sensation of certain bodily changes, then emotion and emotional behaviour should be absent if the bodily changes cannot be sensed, they should be present if the bodily changes are present and are sensed, even if they have been produced artificially and not by the perception of an emotional situation, and, lastly, different emotions should be accompanied by different bodily changes Experimental research shows that none of these expectations is fulfilled

First, Sherrington showed that dogs with the spinal cord severed in the lower cervical region could express affection, fear, and anger although they could not be receiving any sensations from their viscera¹⁶ Secondly, it has been shown that the injection of adrenalin produces artificially the same visceral and vasomotor changes as take place in fear, but that persons who have had such an injection do not feel fear in the absence of a fear-producing idea or situation¹⁶ Thirdly, Cannon has shown that such different emotions as fear and rage have the same visceral and vasomotor accompaniments¹⁸

The real point behind the James-Lange theory was a protest against the earlier tendency to treat emotion as if it were a purely mental event and to regard as unimportant the bodily changes which accompany the mental experience of emotion In this protest they were no doubt right But the way in which they emphasised the importance of the bodily changes, stating that the sensations from these were necessary and sufficient conditions for the emotional experience, turns out to be at variance with the experimental facts

If we turn to James's original argument that if we think away all bodily sensations from an emotion, nothing is left but a cold and neutral state of intellectual perception, we can see that this argument has no real force It describes a thought experiment which, in fact, we cannot carry out We cannot think away all bodily accompaniments of an emotion any more than we can think away any other constituents of a complex mental state We can try to imagine an emotion without those bodily changes, but that is a very different matter it is forming an opinion, not observing a mental process We cannot find out by any introspective process what a state of fear would be like without the pallor of the skin

and the unpleasant sensation in the digestive organs. We can only know that it would be different—probably less unpleasant and possibly with less tension towards escaping behaviour. It is certain that much of what we call emotional experience is made up of visceral and vasomotor sensations, and it is possible that the strength of the behaviour drive in emotion is partly the organism's reaction to these changes. That, however, is a somewhat different statement from that of the James-Lange theory as it was originally expressed, even though it may contain all that would have been regarded as of essential importance in the theory.

7. Qualities of Feeling

An emotion, or any other affective state, may be pleasant or unpleasant. So also may other states of consciousness, some sensations are acutely unpleasurable. In ordinary speech we commonly give the name "pain" to the quality which is the opposite of pleasure. Such a usage would, however, cause confusion in psychology since this word is also used for a particular kind of organic sensation such as that given by a sharp point applied to the skin or by a decaying tooth. The organic sensation of pain is generally acutely unpleasant, hence the popular confusion of the two ideas under one word, but, if it is small in intensity, a pain may not be unpleasant and may even be pleasurable. Also some extremely unpleasant experiences, such as some smells, have none of the character of pain sensation. The term *unpleasure* is therefore generally used in psychology as the opposite of pleasure. The name *affective tone* (or *feeling tone*) is commonly given to these opposite feeling qualities of pleasure and unpleasure.

The behaviour concomitants of pleasure and unpleasure are the *seeking* and *avoiding* reactions respectively. A pleasurable emotion has as its impulse a reaction which belongs to the seeking class, and an unpleasurable emotion is similarly attached to a reaction of the avoiding class. Although emotions and states of pleasure and unpleasure may be regarded primarily as ways of reacting to the environment, they may also be produced as a result of physiological events within the organism or of the individual's psychological history. In neither case have they any external exciting cause. It is within the experience of all of us that moods of considerable unpleasure may result from a bilious attack or other interference with the harmonious functioning of the organism, while the opposite mood of pleasure may be the result of good health rather than any external cause. More extreme variations of mood determined by physiological causes have been observed in serious disease. Thus Head showed that some advanced visceral diseases have as

symptoms moods of acute unpleasure,¹¹⁴ while a highly pleasurable affective state often accompanies the last stages of consumption. The fear which is a normal accompaniment to attacks of angina is also an emotion which seems to be directly caused by a physiological condition.

Persistent or transitory affective states or emotional conditions which are unrelated to the external situation are also found when the cause appears to be psychological rather than physiological. For example, some psychoneurotic persons are oppressed by a sense of guilt or by a persistent state of fear (*anxiety*). Modern methods of psychotherapy follow the idea first put forward by Freud⁹⁸ that these conditions have their origin in forgotten facts of the individual's psychological history. In some cases it is impossible in the present state of knowledge to say whether emotional disturbances have a physiological or psychological origin. There is, for example, the deep unhappiness of the depressed patient suffering from the manic-depressive psychosis which often alternates with an equally extreme state of joy (*mania*). Such alternations of mood not determined by external causes are paralleled by the alternation between depression and exaltation found in normal individuals with the temperament most closely allied to that of the manic-depressive patient (Kretschmer's *cyclothymic* temperament¹¹⁵), but neither in the case of the insane person nor of the normal cyclothyme can one say with certainty whether the alternations of mood are primarily changes in the body or in the mind of the individual concerned.

It was suggested by Wundt that the differences in quality between affects were not only in the degree of pleasure or unpleasure³⁰⁸. He suggested that there were three directions of variation: pleasure-unpleasure, excitation-quiescence, strain-relaxation. Thus an affect might be pleasurable, excited, and tense, or pleasurable, excited, and relaxed, or any other of the eight possible combinations of these pairs of opposites, and a complete chart of possible affects must be a three-dimensional one with three axes representing at their two ends each of these three pairs of qualities. This theory has therefore been called the *tri-dimensional theory* of feeling. It was hoped that measurement of various bodily changes mainly connected with blood supply, such as limb volume, the electrical resistance of the skin, pulse rate, blood pressure, etc., might, by the different effect on them of changes in these three sets of variables, make possible an objective determination of the affective condition of the experimental subject. This hope was not fulfilled. All of these quantities do change with the affective condition of the subject, but it has not proved possible to correlate

these changes with changes in the three variables postulated by Wundt

A modified form of this theory has been put forward by C. S. Myers.²⁰¹ This is, in effect, a bi-dimensional theory in which Wundt's two dimensions of *excitation-quiescence* and *strain-relaxation* are replaced by one dimension of variation between enhanced and diminished activity

A favourable environment may lead to either enhanced or diminished activity. The affect which we recognise in ourselves is, in the first case, *exhilaration* (or *gladness*), in the second it is *ease* (or *bliss*). Similarly, an unfavourable environment may lead to enhanced or diminished activity, and the corresponding affects are *uneasiness* (or *distress*) and *depression* (or *sadness*) respectively

8. Emotion in Animals

If emotional states could only be recognised introspectively, we should have no grounds for speaking of animal emotions. There are, however, recognisable behaviour characteristics of emotional states. In most animals other than the Primates, changes in facial expression and the effects of changes in the blood supply such as pallor and flushing can be seen with difficulty or not at all. There remain as easily observable characteristics: changes in amount of activity, persistence of behaviour directed towards a single goal, and the vocal accompaniments of emotion. If, therefore, we remain strictly behaviourist in our point of view, as we must when studying animals, it is still meaningful to talk of emotion and emotional behaviour.

All three of these characteristics need not be present in any particular case of emotional behaviour. There is no difficulty in recognising emotional behaviour in a terrier looking for a rat. Nor is there in the behaviour of a cat stalking a bird, although the cat is silent. Emotional behaviour of courting birds has been vividly described by Julian Huxley.¹²⁹

Of the Louisiana Heron he reports that, while the pairs are on their territory before nest-building, they sit still for hours at a time with the head of the hen generally resting on the cock's flank, but occasionally this passivity gives place to wild excitement. "Upon some unascertainable cause the two birds raise their necks and wings, and, with loud cries, intertwine their necks. The long necks are so flexible that they can and do make a complete single turn round each other—a real true-lover's knot!" This once accomplished, each bird then—most wonderful of all—runs its beak quickly and amorously through the just raised aigrettes of the other, again and again, nibbling and clapping them from base to tip

Of this I can only say that it seemed to bring such a pitch of emotion that I could have wished to be a Heron that I might experience it "

9 Control of Emotion

The young child in such a situation as that of frustration may respond by an emotional storm which does little to alter the situation which called it out. As he gets older he learns to inhibit the purely emotional response and to exhibit voluntarily controlled behaviour directed towards reorganising the external situation in a direction more satisfactory to himself. As he learns to do this, emotional behaviour becomes less common and less intense. Wholly uninhibited emotional responses amongst human adults are normally rare, and when an individual does exhibit outbreaks of rage, panic, etc., these are recognised as pathological. They are one of the symptoms of *regression* or a going back to infantile modes of behaviour.

The mechanism of control is normally psychological, it is a technique of behaviour picked up by the child as he grows up so that he may be able to adapt himself to the requirements of a society which does not tolerate more than a limited amount of overtly emotional behaviour. At the same time it is a technique not completely acquired by many adults. The acquirement follows certain principles of psychology which should be understood by those concerned with the education of children or who feel the need for emotional self-education. There is first the principle of *reinforcement* every uncontrolled outbreak of emotional behaviour tends to make subsequent outbreaks more difficult to control, while conversely every successful attempt at control makes subsequent success more easy. Secondly, there is the principle of *habituation* every occurrence of a situation of the kind leading to an emotional response which does not in fact lead to an emotional response renders less likely the occurrence of an emotional response to that situation in the future. Thirdly, there is the fact that conscious awareness of the factors in oneself tending to make a given external situation lead to an emotional response makes it easier to control that emotional response. The opposite to such conscious awareness is the condition Freud called *repression*, in which the individual is unaware of an emotional disposition such as a fear or a prejudice which is determining his reactions to his environment. Emotional control, therefore, becomes easier as one gains an objective and insightful understanding of one's own mental dispositions.

CHAPTER VI

THE BODILY MECHANISM OF MIND

1 The Evolution of the Nervous System

As we pass from the lower to the higher forms of animal life, we notice that, on the whole, organisms become larger and also capable of more complex patterns of behaviour. Parallel with this change in size and in complexity of behaviour, there is a more elaborate system of intercommunication between different parts of the organism. The mechanism of intercommunication is the *nervous system*, which consists of cells playing various parts in this process of intercommunication. The capacity gained by such a system of intercommunication by means of which various parts of the body can be simultaneously or successively moved in order to achieve some end may be called *co-ordination*.

The attainment of bodily co-ordination by conduction of nerve impulses through the nervous system results in our bodies acting not as sets of separate parts, each pursuing its own ends, but as integrated wholes in which each part (hand, eye, foot, etc.) is carrying out activities determined by the needs and purposes of the organism as a whole and correctly adjusted to the contemporaneous activities of other parts of the organism. Thus our bodily parts behave not as a disorganised rabble but as a disciplined army pursuing common ends under central control. The value of this service of the nervous system is so familiar that its importance may well be forgotten until it has been partially lost by a disease or injury of the nervous system which interferes with some part of its function in the control of the organism.

It is true that we find some measure of co-ordination in animals much smaller than ourselves which have no nervous system, but it is co-ordination too imperfect to be of service to a larger animal with more complex problems of adapting itself to its environment. The Amoeba, for example, without any nervous system, is not entirely lacking in the capacity for one part of its body to respond to stimulation of other parts, but the spread of excitation is slow and the resulting co-ordination is very inefficient as judged by the standards we apply to more developed organisms. The first step in attaining a more efficient type of transmission of impulses is the differentiation of body cells with the special function of conveying impulses from one part of the body to another. These cells are

elongated processes called *neurons*, with a nucleus at one end. In appearance as well as in their function they are somewhat analogous to the wires of a telegraph or telephone system. Some of these, the *sensory* (or *receptor*) neurons, originate in minute structures called *end-organs*, which are found in the skin and in the special organs of sense such as the eye, ear, etc. These end-organs originate nervous impulses when they are acted upon by some stimulus from the outside world or starting in the body itself. Nervous impulses travel along the receptor neurons to the central part of the nervous system (brain, spinal cord, and cerebellum), which acts as a distributing mechanism from which other impulses are sent out along *motor* (or *effector*) neurons to muscle spindles or other reacting parts of the body, such as glands.

The first development of such specialised conducting cells is found low down in the evolutionary scale although its efficiency is at first not great. The necessary speed of nervous conduction for rapid co-ordination was not attained in the early stages of evolution of the nervous system. The speed in the freshwater mussel, for example, is less than half an inch per second as compared with four hundred feet per second in ourselves. Obviously our own movements to avoid injury would be wholly ineffective if information were not conveyed to the central part of the nervous system more quickly than that.

In other respects the earlier types of nervous system seem very crude and simple as compared with the kind of nervous system we find in the higher vertebrates. The jellyfish, for example, has simply a network of nerve fibres through which impulses travel over the whole organism from a number of originating centres. These impulses cause the bell of the jellyfish to contract rhythmically and, even when the body of the jellyfish is cut in various ways, the contractions go on in any part which is not entirely cut off from an originating centre.

It is as if the jellyfish, instead of having its communications arranged through an up-to-date telephone system with a central exchange, had a system such as can be found in some Alpine valleys where all subscribers are on the same wire so all receive the same messages. The most serious deficiency of the nervous system of the jellyfish is the absence of a brain or anything even remotely resembling a brain. It is like an army which has achieved inter-communication but with no vestige of central control. In consequence there are obvious limitations of the jellyfish's behaviour possibilities. There are a small number of stereotyped responses with only so much co-ordination as is involved in all parts of the

body taking part in the same response at the same time, this is all that such a simple structure of nervous system can accomplish.

A considerable step forward is made in nervous development in such organisms as the earthworm, in which the nerve fibres radiate to and from a number of nerve centres, or ganglia, which are analogous to a series of small telephone exchanges each of which serves a small number of subscribers and which also can make connection with neighbouring exchanges. Alternatively, we may compare this arrangement with that of an army organised under a number of generals but with no commander-in-chief, or with the organisation of Great Britain in feudal times under a number of independent barons.

Even in such a creature as the earthworm we find a hint of the next step forward in nervous evolution. The earthworm has a pair of anterior ganglia at its front end which are more important than the others but which nevertheless have no real correspondence with the vertebrate brain. It has been shown that the earthworm can learn to find its way out of a simple maze in which there are only two alternative paths, and this rudimentary power of learning is an important advance on what can be accomplished with a still more primitive type of nervous system.

The step from the purely feudal organisation of the nervous system by bringing the greater part of bodily co-ordination under central control is achieved in vertebrates. They have brain and spinal cord forming the central control system from which neurons run to muscles and glands and to which they run from sense organs. There are great advantages to co-ordination in this centralisation. The snake, for example, using a large number of muscles in harmonious combination to perform the complicated action of striking, shows itself a much better co-ordinated mechanism than the earthworm with its relatively unco-ordinated wriggings.

2. The Development of the Brain

There remains one further step to be described in the evolution towards the type of nervous system found in ourselves. As we pass from the lower to the higher vertebrates, there is a progressive change in the relative importance of the brain and the other centres of the central nervous system (spinal cord and cerebellum). In the higher vertebrates, and most strikingly in man, the supreme control of the organism passes to the brain and to one particular part of the brain, the *upper brain* or *cerebrum*, which becomes larger as well as more important than it is in the lower vertebrates. The spinal cord remains the centre for many automatic co-ordinating responses or reflexes.

Complex co-ordination is a very great advantage possessed by animals with a highly developed nervous system, but it is in other directions than in increased co-ordination that we must look for the most important results of the evolution of our nervous systems. The snake is certainly a much more efficient type of reacting organism than the jellyfish, but, as a co-ordinated mechanism, it is doubtful whether the human organism is much superior to that of the snake. It is true that man has limbs differentiated into more separately movable parts than have the lower mammals, although even in this respect he is no better off than the monkeys. Much more important than mere increased co-ordination is the replacement of automatic responses by variable ones, and the organ by means of which variable responses are produced is the cerebrum.

The usefulness to an animal of a nervous organisation which causes it to respond in an invariable and stereotyped way to certain situations is strictly limited. Valuable though such automatic behaviour tendencies may be in environmental situations for which they are adapted, they may be disadvantageous and even dangerous to the organism if the external situation changes in a direction not provided for by the automatic responses of the organism's nervous system. The earthworm, for example, making the same response of automatically wriggling out of the ground when this is disturbed by the gardener's fork as it would if the ground had been disturbed by the approach of a mole, may provide a meal for the robin whose cerebrum enables him to adopt the learned behaviour of looking out for worms when the gardener is digging. Similarly our own lives would be short and full of stress if we had only automatic and invariable responses to enable us to deal with our complex and ever-changing environment. In man we find the greatest variability of response and the greatest power of adaptation to a varying environment because he has the best-developed cerebrum.

Mere variability of behaviour, however, is not enough. The earthworm would be no better off if it were equipped with a nervous mechanism which enabled it at choice to wriggle out of the ground or to stay hidden when it felt a vibration unless it had also some means of ensuring that it adopted the choice of behaviour which was the right one for the particular situation of the moment. So the power of learning, that is, of utilising past experience in the determination of present behaviour, is indispensable to the usefulness of variability, and this power of learning is not to be thought of as merely the development of secondary habits (or automatisms) but as a capacity for understanding the present situation, *i.e.* of *insight*, in order that the correct response to it may be adopted.

The cerebrum is the organ of learning as well as of variability of behaviour. Both variability of behaviour and the power of learning are implied when we speak of intelligence. The degree of behaviour variability and of learning power differ in different individuals and these differences are measured by intelligence tests (Chap XXII). On the physiological side, differences in intelligence may be regarded as differences in the efficiency of the cerebrum in different individuals.

The development of the central nervous system in vertebrate animals was not accompanied by the disappearance of the more primitive type of feudal nervous organisation. Both types of nervous organisation are found in ourselves and in the other vertebrates. The more primitive feudal type is found in the *autonomic nervous system*, also called the *sympathetic nervous system*, which controls certain of the automatic processes of the body and is of psychological importance because these include the physiological changes which accompany emotion. The earlier arrangement of the nervous system continues side by side with the later-developed cerebrospinal system in partial but not complete subordination to it. While the primitive emotional ways of reacting served primarily by the autonomic system are alternative ways of reacting to the more developed responses under the direct control of the brain and spinal cord, these two parts of the nervous system must not be thought of as independent rival means of control of the body. There is close connection between the two systems and there is good evidence of representation of the autonomic system in the cerebral cortex. The central nervous system and the autonomic system work as a unit, although particular situations may arise (as in a man struggling to control fear or anger) in which impulses belonging to the two systems are in competition with one another.

3 The Human Brain

The human brain, seen from the outside, appears as a crumpled or convoluted surface. What is seen is part of the surface of the upper brain or cerebrum. This surface is the *cerebral cortex*, popularly known as the "grey matter" of the brain, its crumpled appearance may be considered to achieve the end of maximising the amount of surface without increase of volume of the cerebrum. The "white matter" below the cortex consists of large numbers of elongated nerve cells conveying impulses from one part of the organ to another. The cortex itself contains a different type of nerve cells with a number of short processes which give them a somewhat spidery appearance. These must be regarded as originators or distributors of nervous impulses which travel along the

effector neurons to the reacting parts of the organism, *e g* muscle fibres, glands of internal secretion, etc

The cerebrum is divided into two hemispheres on the right and left of the head which have somewhat different functions. All nerve fibres to and from the peripheral parts of the body cross over to the hemisphere on the opposite side. Thus the left cerebral hemisphere controls movement in and receives sensations from the right side of the head and body, while the movement and sensations of the left side of head and body are similarly a function of

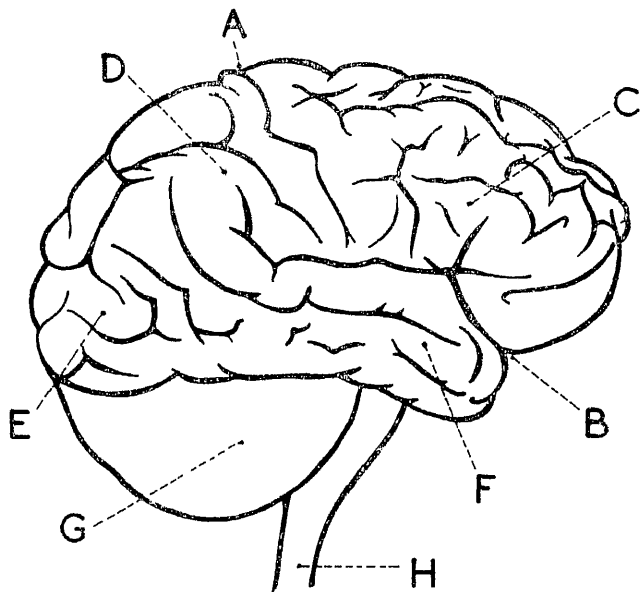


Fig 2 Side view of right lobe of human cerebrum

- | | |
|---------------------|----------------------|
| A Fissure of Roland | B Fissure of Sylvius |
| C Frontal lobe | D Parietal lobe |
| E Occipital lobe | F Temporal lobe |
| G Cerebellum | H Spinal cord |

the right cerebral hemisphere. An exception to this rule is found in the case of vision, since sensory impulses from the left side of both retinas go to the left cerebral hemisphere while those from the right sides of the retinal surfaces go to the right cerebral hemisphere. The control of speech movements is also an exception to the rule of crossing, since these movements are controlled by one hemisphere only.

An area on the anterior side of the Fissure of Roland (Fig 2) has been shown to be the part of the cerebral cortex which controls

muscular movements on the opposite side of the body. Injury to or extirpation of part of this area causes paralysis of some part of the body, the lower part of the body being controlled by the upper part of this area while movements of the head and face are controlled from its lower part. Injury to certain other areas produces disturbance of one of the special senses. The control of speech is found to be a function of the left cerebral hemisphere in right-handed people and of the right cerebral hemisphere in left-handed people. A convolution of this hemisphere in the posterior part of the frontal lobe above the Fissure of Sylvius was claimed by Broca as the brain centre controlling speech. Although injury to this area certainly produces serious disturbance to speech, Head has shown that speech control is by no means confined to this area but that various kinds of disturbance of the complex function of speaking are produced by brain injury over a considerable part of the left cerebral hemisphere.¹¹⁶

The control of speech by a single hemisphere of the cerebrum explains the easily observed fact that a cerebral stroke resulting from a trauma on the left hemisphere is likely, in a right-handed person, to produce a disturbance of speech as well as paralysis and blunting of sensation on the right side of the body. In a left-handed person, however, the opposite relation holds, and loss of speech results from a cerebral stroke affecting the right cerebral hemisphere and producing paralysis and blunting of sensation on the left side of the body.

Since one cerebral hemisphere controls the more dexterous side of the body and also controls the function of speech, this is known as the *dominant hemisphere*. Although a preference for the use of one hand does not appear until some months after birth, there is ample evidence that this preference is innate, and that the right-handed person is born with a tendency to develop the left hemisphere as the dominant one, while the left-handed person is born with a tendency to develop the right hemisphere as the dominant one. It must not be concluded that the non-dominant hemisphere is a mere organ for co-ordinating sensations and movements on the opposite side of the body. Recent research has produced evidence that the non-dominant hemisphere also has its own functions in such complex processes as perception and that injury to it may produce mental disturbances to such higher processes no less real than those produced by injury to the dominant hemisphere although less obvious to ordinary observation.²⁰⁸

There is one pair of organs in the part of the brain below the cerebrum which are of considerable psychological interest. These

are the *optic thalami*, which, in addition to being centres for correlating nervous impulses from various sense organs including the eye, have been shown by Head and Holmes to be closely connected with emotional reactions¹¹⁵ They reported that if the connection between the optic thalamus and the cerebral cortex was severed, there was resultant change in behaviour and feeling which they called *affective overweighting* Pleasurable sensations were felt as exquisite while unpleasant ones were felt to be unbearable and were accompanied by uncontrollable withdrawal of the part of the body to which the painful stimulus had been applied It seemed to them that the person in this condition was showing the primitive mass responses of seeking and withdrawal which they regarded as the kind of response characteristic of the optic thalamus when control by the cerebral cortex had been removed They referred, therefore, to such affectively overweighted responses as "thalamic responses"

More recent research has, however, thrown some doubt on this view, and the optic thalamus is generally now regarded as a relay station for emotional impulses rather than as the originator of them It also appears that the activity of the thalamus leading to emotional responses may be stimulated by some parts of the cortex although inhibited by others There is evidence that some of the anterior part of the frontal lobe, which has been referred to vaguely as an "association area" because it seemed to have no function connected with movement or sensation, has as part of its function the initiation of emotional responses

4. The Frontal Lobe

In certain areas of the cerebral cortex, injuries produce paralyses or losses of sensation which are immediately obvious These are described as the areas for movement and for the special senses respectively Over a much larger area of the dominant hemisphere, as was shown by Head,¹¹⁶ injuries produce various disturbances of the function of speech and associated difficulties in carrying out some kinds of complex co-ordinating behaviour There also remain areas in which widespread injuries may be found without any obvious loss of any mental capacity A considerable part of the frontal lobe, for example, in either hemisphere, may be destroyed by disease while the patient shows no apparent loss of intelligence or any special mental capacity In some respects he may, indeed, seem to be a more normal personality than he was before his illness, since emotional stability may be improved

The apparent benefit to emotional stability by injury to the frontal lobe has led to the development of an operation called *pre-frontal leucotomy* in which some of the nerve fibres connecting the anterior part of the frontal lobe with the optic thalamus are severed.^{241a} This is used for the treatment of some forms of insanity with remarkable success. Strong emotional outbursts of violence or anxiety are relieved and the patient becomes relatively carefree and happy, as had previously been observed in those patients who had parts of their frontal lobes removed surgically in the excision of a frontal tumour.

It appears that the frontal lobe acts as stimulating centre for the emotional responses mediated by the optic thalamus. It must not be concluded that the frontal lobe is a part of the brain which we should be better without. There is loss as well as gain in the results of pre-frontal leucotomy. After the operation, the patients are reported to tend to be irresponsible and lacking in perseverance and in consideration for other people. If, however, the alternative to leucotomy is insanity, such deteriorations in character are a small price to pay for the advantage of being able to lead a normal life amongst other people.

5. The Electro-encephalogram

Little is known of what goes on in the brain during its activity. It has, however, been discovered that if electrodes are placed in suitable positions on the surface of the head, electric currents are picked up which originate in the brain itself. These can be amplified and recorded. The record so obtained is called an *electro-encephalogram*.

We are very far from being able to tell what an experimental subject is thinking about by looking at the form of his brain waves. Only very simple correlations between wave form and mental state have so far been observed. The most striking of these is the *alpha rhythm* of about ten waves per second observed when the subject is quiescent and has his eyes closed. These break up into more complex waves of higher frequency when he opens his eyes or starts any mental activity. An electro-encephalogram showing alpha rhythm is shown in Fig. 3. It will be noticed that there are also some signs of waves both of higher and lower frequency than that of the alpha rhythm.

The main practical usefulness of electro-encephalography has been as a means of diagnosing epilepsy, which generally though not always, shows a characteristic pattern of waves of lower frequency than those of the alpha rhythm. Abnormalities of waves are also found with some brain injuries. Electro-encephalography is the

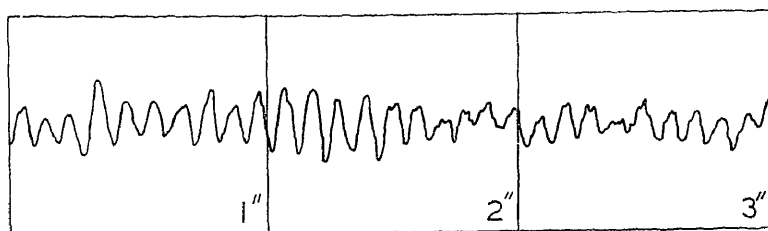


Fig 3 Electro-encephalogram record showing predominant alpha rhythm

subject of a great deal of active research at the present time, and it seems likely that in the future we shall be able better to interpret the psychological meanings of the various wave forms of the electro-encephalogram

CHAPTER VII

THE EMOTIONAL DISPOSITIONS, PERSONALITY AND TEMPERAMENT

1. The Sentiments

For the purposes of a systematic psychology we need names not only for mental events but also for mental dispositions. For example, when we talk of our memory of what happened yesterday we are referring, not to the particular act of remembering, but to the permanent possibility of carrying out that act if the appropriate causes for it occur. We may not be thinking of yesterday at the moment, but we do not therefore say we have ceased to have a memory of yesterday. We could still think of yesterday if we wanted to, or if something took place that recalled it into our train of thought. The disposition remains even when the corresponding event is not taking place. Thus a disposition is a postulate to account for the fact that a certain mental event can from time to time take place.

In ordinary speech we also postulate dispositions to account for the occurrence from time to time of emotions which are themselves mental events. When we say that a person is angry we are referring to a mental event, we mean that he is actually experiencing an emotion with a particular quality of affect and with certain bodily accompaniments. When we say, however, that one man hates another, we are asserting nothing about the particular experience that he is having at the moment, we are attributing to him an enduring disposition to have certain emotions in certain situations. If *A* hates *B*, it is possible that he is not thinking about *B* at the present moment at all, and in that case he is having no experience about *B*. If he does think of *B*, his experience is not necessarily of any one affective quality, he would have a variety of different experiences in different situations of *B*. He would, for example, feel repugnance in *B*'s presence, anger at his good fortune, joy at his misfortune, and so on. The disposition to feel such emotions in such situations of *B* is *A*'s disposition of hate.

The dispositions of love, hate, respect, etc., have been called *sentiments* by Shand,²⁴⁵ and this usage has been followed by McDougall and most other British psychologists. Shand described the sentiments as the greater systems in which the emotions are organised, while McDougall defined a sentiment as an organised

system of emotional dispositions centred round the idea of some object^{17.}

The formation of a sentiment involves the limitation of an emotional response to some single member or to a small group of the whole class of objects which can primitively elicit it. A male frog is equally attracted to any female frog, his sexual response is perfectly general to every member of that class. A man's sexual response, on the other hand, may be called out only by a particular woman. We say that he is "in love" with her. His tendency to react is restricted, for the time at least, to one particular object. Or he may be sexually attracted to a restricted class of women, let us say to all women with red hair.

It is obvious that this kind of specialisation of response takes place at a point of development in the animal scale much lower than that of a human being. Even bees behave differently towards members of their own and of other hives, responding by the behaviour of primitive comradeship towards bees of their own hive, and by pugnacity towards strange bees attempting to enter their hive.

Dogs and cats are also clearly selective in their instinctive responses. It is sometimes said that a dog shows anger if movement is prevented by someone holding its feet. This statement is too general. The dog's response will depend on the person holding him. He may, in fact, show any one of a wide range of responses—pleasure, amusement, boredom, cringing submission, annoyance, or rage. His instinctive responses are specific to particular persons, they are not general responses to a situation.

One must in many cases regard particular dispositions or sentiments as built on the foundation of more general dispositions which were present earlier. A man's love for a particular woman, for example, is an example of the becoming specific of a more general sex dispositional tendency. When these more general tendencies are themselves inborn, they can properly be referred to as instincts. Not all general emotional tendencies are, however, inborn. A general tendency to dislike foreigners or to be suspicious of other people may be a pathological acquisition to be explained partly or entirely by the mental history of the individual. Even such a general emotional disposition as the sex tendency is also not purely innate, it has been modified in various ways by the history of the individual before he or she falls in love.

There are various ways in which it happens that a previously general emotional disposition becomes specific to a particular object. Forces of social approval and disapproval may make a general tendency to dislike strangers become a specific hatred for

a particular group of people. So also may a particular humiliating experience attributed to a member of the group which becomes hated. The forces of social approval and disapproval may be directed by propaganda, as when in war-time people are taught to hate the national group which at the time is the enemy. A specific sentiment may also develop because it fits into the pattern of a previously existing specific sentiment, as when one hates another person because he resembles someone already hated. One theory of the choice of objects for the formation of the sentiment of love is that this is determined by a resemblance to the already loved parent of the opposite sex. Mere contiguity at the time of the awakening of a generalised emotional disposition may also be an important factor in determining the object of a specific emotional disposition. One way in which parents seek to control the love objects of their children is to see that they come in contact with those whom the parents regard as suitable love objects at the time of awakening of the disposition to fall in love.

The possibility of a general emotional disposition becoming specific to a particular object through mere contiguity when the general emotional disposition is first active is illustrated by the genesis of the following and avoiding reactions of young chicks studied by Spalding²³³. It has been generally observed that chicks a few weeks old will follow their mothers and run away from other living creatures. It might be supposed that the behaviour of following resulted from an instinct originally specific to the mother, and that there was a similarly innate tendency to run away from other living things. But Spalding showed that this was not the case. In the first few days of their lives the chicks showed a generalised instinctive response of running after any moving object. After this time they developed an equally generalised response of running from moving objects. The chicks of a few weeks old ran after the mother and away from other things, simply because the mother was the object presented to them when the "following" disposition was present. The generalised disposition itself faded away, as was shown by the fact that later they would run from any new moving object presented to them, but the habit of following the mother remained. The generalised following disposition had become specific to the mother as a result of her contiguity at the appropriate time. It could also become specific to some other animal that happened to be present instead of the mother during these first few days. Thus families of young chicks were found to form the habit of following a man if he were frequently with them during the days when the general instinctive tendency to follow was present.

If no habit of following is formed during these first few days, as often happens with chicks reared in an incubator, it is not formed afterwards. Then the chicks will fly from a hen as they will from any other strange animal. The general emotional disposition now present is one that leads to fear and flight. Such inborn general tendencies as the chick's following instincts belong to the class of innate dispositions which were called by James "transitory instincts"¹³⁸. In such cases the instinctive disposition itself disappears and what remains is a habit system which has been built on it as foundation.

It is obvious that not all instinctive emotional dispositions disappear altogether when they become the foundation for a specific emotional disposition or sentiment. When a man falls in love with a woman, for example, his sentiment for that particular woman has been founded on, and has to a certain extent replaced, his general sexual impulse towards "woman". He may be said to have formed an emotional habit as the chick has formed a simple bodily habit. But it is certainly not true that the general attraction of woman has disappeared. This residual non-specific element is, however, less strong than it was before the formation of the sentiment. The earlier general sexual tendency has changed but has not disappeared.

Sentiments have been divided into three classes: sentiments for single objects, those for all objects of a certain class, and those for abstract conceptions. These may be called *concrete particular*, *concrete general*, and *abstract* sentiments respectively. For example, love for a particular child, or hatred of a particular cat, would be *concrete particular sentiments*, while love for all children, or hatred of all cats, would be called *concrete general sentiments*. As examples of *abstract sentiments* we may take the love of justice or hatred of cruelty.

Emotional reactions are called out even by abstract sentiments, but less strongly than by the concrete sentiments. It is easier to love a child strongly than to love justice. Since, however, many of the sentiments of social importance are of the nature of abstract sentiments, it is important that the emotional reactions of these should be made as strong as possible. This is often done by providing a concrete nucleus round which an abstract sentiment can gather. The national flag and King provide such nuclei for the abstract sentiment of patriotism, and, as a result, this sentiment may take such a form as to suggest to the careless observer that it is a concrete particular sentiment for this nucleus. Similar nuclei often serve a similar purpose in the religious sentiment. A sacred book, a cross, a totem, or an image, may be the concrete object

which suffices to call out the emotions of the religious sentiment. The reason for the existence of these foci is the difficulty with which strong emotional reactions are produced by purely abstract sentiments.

Every sentiment undergoes a process of development and organisation throughout its period of existence. A sentiment of hate, for example, normally becomes strengthened when we indulge in the revengeful behaviour dictated by it, and weakened and disorganised by persistent refusal to allow ourselves this behaviour and the emotions associated with it. These changes in any sentiment may also react on the rest of the character.

Shand sums up these principles of the development of the sentiments and their reaction on the rest of the character in his *Law of Organisation of the Sentiments*. This law states that "Every sentiment tends to include in its system all the emotions, thoughts, volitional processes, and qualities of character, which are of advantage to it for the attainment of its ends, and to reject all such constituents as are either superfluous or antagonistic", every growing sentiment tends to work towards its own more efficient organisation by rejecting what it does not need and acquiring what it does, and by this fundamental law its advance is governed (*e.g.* men who love themselves tend to grow hard-hearted because the tender emotions have no function in self-love and atrophy from want of exercise)²⁴⁵

2. Attitudes and Interests

The recognition of the necessity for describing such specific emotional dispositions as love, hate, etc., has been more general than the acceptance of the word "sentiment" for this purpose. While "sentiment" was very generally used amongst British psychologists following the tradition of Shand and McDougall, the term *attitude* originally introduced by American psychologists for this purpose has now become at least as generally accepted as "sentiment".⁹

The word "attitude" has sometimes been used in a sense indistinguishable from that of "sentiment". Thus Thomas and Znaniecki define an attitude as a "state of mind of the individual towards a value", and give as examples love of money, desire for fame, hatred of foreigners, and respect for a scientific doctrine.⁹ These would, of course, have been called "sentiments" by Shand and McDougall.

The term has also been used more widely to include not only specific emotional dispositions but also such non-specific emotional dispositions as tolerance, or radicalism, or scepticism. Since these

general ways of reacting have no definite objects or groups of objects towards which they are directed, they would not be included under the term "sentiment". On the other hand, such specific emotional dispositions as anti-Semitism, patriotism, or love for a particular person, may be called either "sentiments" or "attitudes". The term chosen will depend on the tradition of psychology of the person using it. The important thing is that we should understand both terms and should not imagine that a difference of terminology implies a difference in the underlying concept.

The concept of attitude in the wider sense is expressed in a definition given by Cantril: "*a more or less permanently enduring state of readiness of mental organisation which predisposes an individual to react in a characteristic way to any object or situation with which it is related*"⁹.

The student of psychology has to become familiar with the actual terms used by psychologists. If we were free to re-create psychological terminology for ourselves, there would be much to be said for abolishing both "sentiment" and "attitude", and replacing them by the more technical term "emotional disposition", with, when required, an adjective to indicate the degree of specificity with respect to its object. Thus we should call love for a particular person a "specific emotional disposition" and non-specific amorousness a "general emotional disposition". The general direction of development of psychological theory at the present time is to replace terms drawn from popular speech by technical terms created for the purpose of scientific description, although this development is still far from complete.

Both "attitude" and "sentiment" are terms drawn from ordinary speech. I have discussed elsewhere the disadvantages of the use of such terms for a scientific terminology²⁸⁴. In neither case is the use of the word in ordinary speech very close to its technical use in psychology. In ordinary speech we may talk of the sentiment of patriotism, but we also use the word "sentiment" for a weak emotion, for the general tendency to be influenced by emotion, and for a system of opinions. "Attitude" has the further objection that it is also used in experimental psychology with a quite different meaning for the transitory determinants of reactions resulting from such factors as the instructions given to the experimental subject and his state of readiness to perform the task. Thus, if an experimental subject is told to look out for light and to press a key as soon as he sees it, he is found to take a longer time to press the key than if he had been instructed to be ready to press the key and to do so when he saw the light. These two states of readiness for action induced by instructions emphasising, in the

first case the expected signal, and in the second the required action, lead to measurably different results, and these results have been ascribed to the different *mental set* or *attitude*. It is obvious that confusion may result from using "attitude" in two such different senses, in one of which we are speaking of a more or less permanent disposition and in the other of one that is essentially transitory. If "attitude" is to be used for an emotional disposition it is obviously better to restrict its use to that meaning and to use the term "mental set" for the earlier meaning of "attitude".

Another term used for emotional dispositions is *interests*. The interests of an individual are such things as religious interest or his interest in acquiring wealth or in achieving a position of domination. While "interests" is often used in a sense no different from "sentiments" or "attitudes" in such a phrase as "interest in stamp collecting", it is more generally used for the larger systems of emotional dispositions, which include many specific emotional dispositions. Thus the three examples given above (religious, economic, and power interests) obviously are large dispositional systems which include many particular emotional dispositions.

The application of the technique of mental testing to the investigation of attitudes and interests has been used to a considerable extent in recent psychology. An *attitude test* is constructed by making a number of standardised statements on some topic and asking subjects to indicate their degree of acceptance or rejection of each statement. The statements may, for example, be on religious or political questions, on anti-Semitism or on problems of sexual behaviour. If norms are obtained by applying such a test to a large number of representative individuals, a particular subject may be rated by comparing his answers with those of the representative group. The results may then be used in the investigation of such problems as that of the relationship between different attitudes, to discover the degree to which attitudes are determined by such factors as schooling or social status, or to find out what kind of educational influences can be used to reduce attitudes, such as anti-Semitism, which are socially undesirable.¹⁹

3. The Temperaments

The differences between the personalities of different individuals are partly the result of the different attitudes and sentiments which have been produced by the action of their social environment, and partly by more general differences between their systems of emotional dispositions. There is a certain consistency in the emotional reactions of any individual, one shows long and lasting loves and hates, another may show much emotion in expression

but show no constancy in the objects which call out his feelings. It is this general character of a man's emotional reactions that is called his *temperament*. Temperamental differences are probably partly innate and partly acquired, determined in part by a man's inborn physiological constitution, *e.g.* by such factors as the innate balance of his endocrine secretions, but also to some extent by the influence of social and other environmental factors which may affect his temperament by changing the activity of his sympathetic nervous system, or the activity of his endocrine glands, or in some other way.

Descriptions of the different temperaments have been current since the time of Hippocrates, who distinguished four temperaments, each determined by the presence in the blood of an excess of one of four "humours". Descriptions of these have varied in different writers, but the main characteristics have been much the same. The *sanguine* temperament was characterised by superficiality of emotion and inconstancy, the *bilious* temperament was one which showed depth and stability of emotion and inflexibility of purpose, the *nervous* temperament was characterised by rapidity of thought and movements, while the *phlegmatic* temperament was accompanied by slowness of thought and movement.

The classical description of the temperaments was, no doubt, a fruit of acute observation which made distinctions which can still be recognised as having a certain validity. Scientific typologies have, however, followed other lines. More exact methods of measurement do not indicate that these are the useful directions along which to distinguish the temperamental aspects of personality amongst people in general.

There are, however, pathological mental conditions in which divisions seem to fall closely along the lines of the classical temperaments. Mania and melancholia, for example, are conditions of extreme nervous and extreme phlegmatic temperaments respectively. Similarly, excessive secretion of the thyroid gland produces an extreme excitation of the emotional system, which corresponds to some extent with the classical description of the sanguine temperament. It is possible that the classical temperaments are descriptions of the effects on character of different conditions of secretion of the endocrine gland system. Perhaps the classical temperaments should be regarded as descriptions of the types of personality produced by abnormalities in the balance of physiological processes governing emotional patterns, particularly in the balance of the secretions of the endocrine glands.

Temperament has sometimes been defined as the innate part of personality. If, however, we use the term "temperament" for the

general character of the emotional dispositions, it must be recognised that these are only in part innate. The general character of a man's emotional dispositions is also partly determined by environmental influences. If, for example, an individual lives in a social environment in which uninhibited expression of joy, anger, and sorrow, is the approved type of response, his temperament will tend to be of the type showing free expression of emotion.

4. Personality

The term "personality" is often defined by psychologists to cover all the respects in which one individual can differ from another. A list of personality differences may thus include differences in physique, in health, and in intelligence, as well as in attitudes, interests, and characteristic ways of behaving. The way in which the word is used, however, is often much more restricted than is implied by this definition. "Personality tests" are often distinguished from "intelligence tests" and refer to tests of such characteristics as aggressiveness, expansiveness, or altruism. In this narrower sense "personality" has much the same meaning as the ordinary use of the word "character", and may be regarded as a technical psychological term with much the same connotation as "character" in everyday speech. It is inconvenient to use the same term with a very wide and a relatively narrower meaning, and we shall keep most closely to the ordinary psychological use of the term if we restrict it to its narrower sense. We may then define *personality* as the system of emotional dispositions which determine an individual's characteristic ways of behaving in different situations.

The separately measurable elements of personality are commonly called *traits*. A psychological assessment of a person's character may be made by estimating or measuring, by means of tests, the extents to which he possesses various traits such as dominance, perseverance, altruism, introversion, etc. Each of these traits has an opposite, so the measurement is two-directional (or bipolar), thus dominance has submissiveness as its opposite, perseverance has instability of purpose, altruism has selfishness, and so on.

It is clear that traits are not themselves observables. What we can observe are facts of behaviour and consistencies between these. If a man's behaviour showed no consistency, so that the way he behaved in one situation gave no ground for predicting how he would behave in a new related situation, we should not feel any need for such terms as "personality", "character", or "personality traits". Nor should we use such terms if such consistencies as we

observed in his behaviour seemed to be entirely determined by environmental circumstances and not at all by anything characteristic of the individual himself. It is because the more aggressive man will be more likely to show truculent behaviour in a wide variety of circumstances than the average person that we find the trait of aggressiveness a significant one for characterising personality differences.

The use of a trait name does not imply that the quality of personality referred to is inborn. It may be so to some extent, but it may also be an effect of the circumstances of the individual's life, of his education, of his occupation, and of the people with whom he has associated. A man's personality is in large measure a product of the social influences to which he has been exposed. It is also a social phenomenon in the sense that it is only in a social setting that the patterns of behaviour which indicate personality are apparent. Thus, while a man can be intelligent by himself, he can be aggressive only in relation to others.

5. Typologies and Trait Systems

The problem of the basic principles of classification of personality differences is one that has a long history, beginning with the Hippocratic classification of types of temperaments. Most of the numerous typologies that have been put forward have been based on casual observation rather than on any methodical principle of analysis. In spite of differences of nomenclature, there is a general tendency for different writers on human types to make divisions along similar lines.

William James divided mankind into the *tough-minded* (scientific and practical) and the *tender-minded* (metaphysical and theoretical)¹³¹. E. R. Jaensch, starting from the study of eidetic imagery, distinguished two main types of character¹³² the T-type whose facial expression and character formation resembles that found in the disease of tetany, and the B-type with the same relation to exophthalmic goitre (Basedow's disease). Later a more general division into *disintegrate* and *integrate* types was proposed which included the T and B types respectively as special cases.

Kretschmer's system of typology was based on the conviction that there was a close relationship between the physical structure of the body and the personality type¹³³. He divided men into three physical types: the *athletic* (large muscle and bones), the *asthenic* or *leptosomatic* (lean, flat-chested, and narrow-shouldered), and the *pyknic* (with tendency to rounded contours of face and body). He claimed that there was an almost invariable association between the type of disorder of the insane and their physical type. If

persons of the athletic or asthenic physical types become mentally deranged they develop a disorder of the *schizophrenic* group, such as dementia praecox, paranoia or delusional insanity, and schizophrenia. In all of these disorders the patient seems to be more or less detached from ordinary social influences and to be shut in with a world of ideas of his own. Persons of the pyknic physical type, on the other hand, if they become mentally deranged, develop the *cyclophrenic* disorder of manic-depressive insanity. In this form of insanity the patient shows typically alternation between the expansive emotional excitement of mania with a rapid flow of ideas, and the slow, depressed condition of melancholia.

These observations about the relationship between physical type and forms of insanity was applied to problems of normal personality typology by Kretschmer's theory that normal persons of the asthenic and athletic type tend to have in a mild degree the temperaments and character traits which exist in an exaggerated form in the schizophrenic, they tend to be shut in, relatively unsociable, and self-centred. These he calls the *schizothymic* type. Normal pyknics, on the other hand, tend to show in a less extreme form the alternation of mood of the cyclophrenic, being generally genial and happy but suffering from periods of painful depression during which they may feel an impulse to suicide. These are of the *cyclothymic* character type.*

These correlations of character type with physical make-up are deeply grounded in popular belief. We expect the round-faced man to be hearty and friendly, and the dreamers as well as the self-centred and ambitious are commonly represented as of the hatchet-faced physical type. Thus we have the well-known passage in *Julius Caesar*

"Let me have men about me that are fat,
Sleek-headed men, and such as sleep o' nights
Yond' Cassius hath a lean and hungry look,
He thinks too much: such men are dangerous."

In Kretschmer's terminology "Let me be surrounded by pyknics. Cassius is of asthenic physical type and therefore of schizothymic character, possibly paranoid."

Jung's distinction of *extrovert* and *introvert* is based not so much on a distinction between general emotional dispositions (i.e. temperaments), as on temperamentally determined attitudes.^{1 12}

* Kretschmer also uses the terms *schizoid* and *cycloid* for those who show these character formations in an extreme form, although not sufficiently so to be mentally deranged. Some of these have been men of outstanding ability as Robespierre and Mayer (the German discoverer of the principle of conservation of energy) amongst schizoids, and Beethoven and Ruskin amongst cycloids.

The introvert is the person to whom phantasy is more important than reality, who tends to adapt himself by thought construction rather than action, who becomes a philosopher rather than a scientist. The extrovert, on the other hand, is more concerned with external reality than with phantasy, adapts himself by feeling rather than thought, acts on the environment instead of phantasying, and tends to have scientific rather than metaphysical interests. The extreme case of introversion is the person suffering from *dementia praecox*, who lives entirely in a world of phantasy and has lost contact with the real world, while the extreme case of extroversion is the *hysteric*.

There are certain complications which Jung has found necessary to introduce into his conception of introversion and extroversion. In his earliest work on the subject, Jung said that one might be consciously extroverted but unconsciously introverted, so that traits of character belonging to the two attitudes in the same person could both be explained on the introvert and extrovert theory. Later, he has introduced a further complication by subdividing both introvert and extrovert types into four subclasses in which adaptation is found by thinking, feeling, sensation, and intuition, respectively.¹⁴⁴ Jaensch and Kretschmer also have subdivisions of their two main character types.^{132 156}

We may notice that although all of these writers use different criteria for making their division, the dividing line runs in approximately the same position for all of them. "Tender-minded", "dis-integrate", "schizothymic", and "introverted", are categories which include, on the whole, the same individuals. Similarly for "tough-minded", "integrate", "cyclothymic", and "extroverted". Indeed, many other writers have made the same twofold division and applied different names to the two classes which result. Independent enquiry has provided more terms than the facts require, and it is necessary to decide which of the terms available we shall use. Two have become firmly embedded in psychological literature: Kretschmer's and Jung's. It is therefore convenient to retain both, using the terms "schizothyme" and "cyclothyme" when we are thinking of the temperamental differences, and "introvert" and "extrovert" when we are thinking also of the associated differences in attitude towards reality and phantasy.

It is often required in clinical psychology or in psychological research to make a quantitative assessment of an individual's personality. The first problem to decide is in what directions to make the assessment. Our ordinary language has a bewilderingly large number of names for personality characteristics. A pupil

of G W Allport listed the words in Webster's dictionary designating personality traits and found 4,504, beginning "Abrupt, Absent-minded, Abstemious, Academic, Accommodating, Accurate

¹⁰ Obviously this is too large a number to be used in a psychological assessment. The aim in all psychological measurement is to have as much information as possible contained in the smallest possible number of measurements. For this purpose such a large number of traits would be unnecessary as well as inconvenient, since many of the terms resemble each other so closely in connotation that much of the information would be repeated. The task of reducing the number of qualities to be assessed to a workable number has been done in various ways by multiple-factor analysis (see Chap XXIII) or by the rule-of-thumb method of scrutiny of possible directions of assessment and elimination of those which seem to repeat information given by others.

No two psychologists working in this field would give exactly the same list of traits to be measured. On the other hand, there is a close parallelism between the types of traits measured by different investigators. As a sample of a trait system we may take that of G W Allport (omitting physical measurements, intelligence, and interest assessments) ¹⁰ His system consists of the following eleven bipolar traits

(1) Broad – Narrow emotions (*i.e.* whether the individual in question reacts emotionally to many or to few things and situations)

(2) Strong – Weak emotions (*i.e.* the degree of intensity of his emotional reactions)

(3) Ascendancy – Submission (*i.e.* whether he tends to take a dominant or submissive role in a social group)

(4) Expansion – Reclusion (*i.e.* whether he does or does not talk readily and freely express his opinions)

(5) Persistence – Vacillation (*i.e.* whether he has or has not the capacity to sustain effort when faced by obstacles)

(6) Extroversion – Introversion (Jung's personality dichotomy discussed above)

(7) Self-objectification – Self-deception (Self-objectification is insight into one's own character and motivation)

(8) Self-assurance – Self-distrust

(9) Gregariousness – Solitariness

(10) Altruism – Self-seeking

(11) Social intelligence (tact) – Invariability of behaviour in different social circumstances

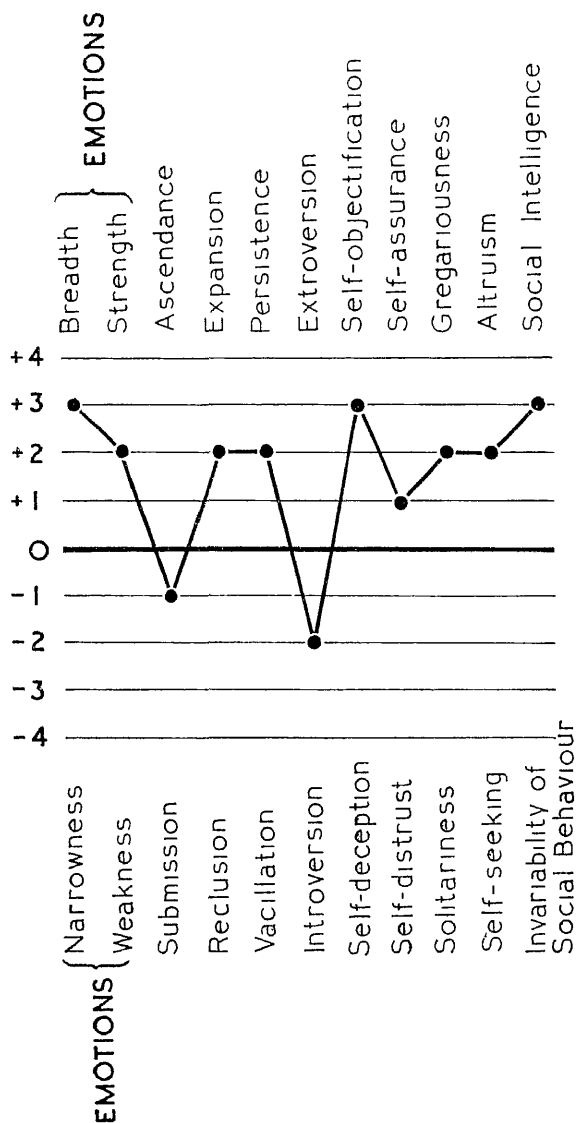


Fig 4 Psychogram of personality traits

The separate measurement of a number of traits does not lead to a single coefficient representative of a single personality. The result of such an assessment is therefore usually represented by a diagram in which the amount of each trait is represented separately by a height above a base line, and these points are joined by a line. The shape of the line indicates the character of the individual concerned to anyone who understands the principle on which the diagram has been constructed. Such a diagram is called a *psychogram*. A typical psychogram showing assessments of a personality on a nine-point scale using the above trait system is shown in Fig. 4.

It is sometimes said that trait measurement can never give a true picture of a personality since this is an integrated whole which cannot be regarded as the sum of a number of traits. Trait measurement does not, however, assume that personality is so made up. It is a practical device for comparing different personalities and seeing in what respects they differ and in what respects they resemble one another. For that end we must decide on the directions of variation in which we shall make measurements or assessments. The traits are these directions, whether they are chosen by the mathematical technique of factor analysis or by selection of words from ordinary speech indicating different qualities of personality. In either case the purpose is to find convenient and informative directions of measurement, there is no reason for the assumption that these directions are separable parts of personality.

The classification of personalities by reference to personality types may be only another way of expressing the same thing as measuring along the direction of personality traits. On the other hand, a type system may have different implications. If, for example, we express Jung's typological system by saying that everyone is either an extrovert or an introvert, we are implying the kind of distribution of extrovert and introvert personalities shown in Fig. 5 (b). In these diagrams the degree of the quality measured is represented by distances along the base line, while the height above the base line represents the relative number of individuals with that degree of introversion or extroversion. The distribution shown in (b) is bimodal, that is, there are two points of maximum frequency with few intermediate cases or none at all, so that there is a clear-cut division into two classes. In the normal distribution shown in Fig. 5 (a), on the other hand, the intermediate individual is the most common, while extremes in both directions become progressively less frequent.

There is no doubt as to which of these two distributions of trait measurements is found in practice. Any method of assessment of

traits shows a distribution of the kind shown in Fig 5 (a). This is also what common experience would lead us to expect. The typical extrovert, as defined by Jung, or the typical choleric individual of the classical system of temperaments, is rare, as is also its opposite. Most of the people we know fall somewhere between these two extremes.

This, however, may also be what is meant by a theory of types. Jung's descriptions of the extrovert type, for example, may not be meant to be descriptive of one class of man including a large number of individuals, but rather of one end of a scale of continuous variation like that shown in Fig 5 (a). Then the theory of types would be merely a different way of expressing the same fact as a



(a) Normal Distribution



(b) Bi-modal Distribution

Fig 5 Two possible frequency curves of trait distributions

normally distributed bipolar trait system. The danger of talking in terms of types is that the author may mean to refer to extremes of a symmetrical distribution while using language that suggests to his readers that he means a bimodal distribution. It may even be the case that he is himself not quite sure which of these two possibilities he means.

6. Measurement of Personality Traits

One way of assessing personality traits is to get a number of people who know the individual in question intimately to rate him on a scale for a number of traits. A nine-point scale may, for example, be used. He will then be given a score of +4 if he

possesses a trait to an extreme degree, - 4 if he possesses the polar opposite trait to an extreme degree, 0 if he is about average, and so on. Such assessments are found to correlate well together, and their mean gives a reasonably reliable estimate of the individual's personality. They are especially valuable as a means of checking the validity of the various kinds of personality test. *Self-ratings* have also been used, but their usefulness is limited by the tendency of the individual rating himself to be more or less dominated by the intention to make a favourable impression. It is not, in practice, always possible to obtain such ratings in situations in which personality assessment must be carried out, *e.g.* in psychological clinics. The *psychiatric interview*, in which the interviewer asks a large number of standardised questions covering the whole field of the patient's behaviour can then achieve the same end with sufficient success although the interviewer may have no previous knowledge of the person interviewed.

More objective tests modelled on the principles of the intelligence test have achieved success in some aspects of personality testing. What is required here is that some task shall be given to the subject such that he will reveal some aspect of his personality by his performance of it. The June Downey will-temperament test was an early example of a test of this type which proved to be too unreliable for practical usefulness¹⁴⁸. Hartshorne and May have devised tests for persistence by setting children extremely difficult puzzles and seeing how long they went on with the task before giving it up¹⁴⁹. Another personality trait that has been successfully measured by objective tests is perseveration, or mental inertia. This is the tendency to go on with activities already entered on, accompanied by difficulty in starting a new activity or resuming it after interruption. Tests for this trait were originally devised by Pinard, who set his subjects such tasks as that of writing the letter **S** forwards and backwards, *i.e.* as **Ɔ**, and compared their speed in these operations with a task in which the forward and backward form of the letter had to be written alternately²¹⁹.

Tests of personality are removed further from the laboratory and nearer to the situations of real life by the use of the psychodramatic technique devised by Moreno¹⁹⁵. In this method of testing, the subject is required to play a role in an imagined social situation but with an actual social group. He may, for example, be asked to imagine himself an officer about to interview a man under his command who suffers from some grievance. In enacting this role he reveals qualities of his own personality. Methods derived from psychodrama have been extensively used in testing qualities of leadership in War Office Selection Boards¹¹².

There are a variety of ways in which personality shows itself in ordinary life, some of which are less suitable for the purposes of psychological assessment than others. The choice of vocabulary and habitual modes of verbal expression are used by dramatists for the purpose of characterisation: they have not, however, been used by psychologists in personality testing. Handwriting, on the other hand, has been found to be a usable index of personality for psychological purposes, and correlations between characteristics of handwriting and personality traits have been used for personality measurement. It seems, however, to be less informative and less reliable as a method of measuring personality than other methods that are available. Speech intonation and habitual facial expression are also widely used in the impressions we form of personality in everyday life, but have not been found practicable methods for scientific assessment.²¹²

There is, however, a wide range of activities which are increasingly used in personality assessment by what are called *projective techniques*.^{226a} The characteristic of tests of this type is that they consist of material of a sufficiently indefinite character to start a perceptual or other mental process whose character will be determined rather by the peculiarities of the subject himself than by those of the presented material. The first of these projective techniques was *Rorschach's ink-blot test*.^{22a} In this test a series of ink blots of indeterminate form was presented to the subject and he was asked to say what he saw in them. A series of coefficients was then calculated from the characteristics of his responses, which represented qualities of his personality. This test required considerable training and experience before useful assessments could be made from it but, with trained testers using not only standardised procedures but also processes of intuitive judgment based on their experience, it was found to give informative results.

Another type of projective test was that in which a series of questions led the subject to elaborate a story in which his own emotional problems and habitual patterns of response were apparent.^{266a} A widely used test of this type is the *thematic apperception test*, in which the starting-point of the stories is a series of pictures in which a figure can be identified with the subject himself and in which the situation is depicted with sufficient vagueness for the subject to interpret it in accordance with the patterns of his own thought and feeling.^{199a}

The aim of projective testing is not in general to obtain an all-round assessment of personality traits such as would be expressed in a psychogram but rather to identify the outstanding personality problems of the individual tested. Their usefulness is

therefore principally in clinical work in which the outstanding abnormalities of the personality of the patient are the points of practical importance. In the practical application of all methods of personality assessment in clinical work it is the extreme ranges of personality differences that are important. Individuals whose measurements for a given trait lie within the central eighty per cent of the whole population are likely to be well adjusted with respect to the behaviour belonging to that trait. Those, however, who lie within the range of about ten per cent at both ends of the distribution may find themselves sufficiently unusual in respect to that trait to be to some extent maladjusted since they are considerably different from the average individual to whom the customs of our society are adjusted. Thus our society is adapted to the psychological needs of those who preserve a certain balance between selfish and altruistic motivation. An individual can remain sufficiently well-adjusted if he is rather more self-seeking or rather more unselfish than the average. Some individuals may, however, have a degree of selfishness which exceeds this tolerated limit of variability. The overriding selfish demands of such an individual and his neglect of the interests of others may make him incapable of social co-operation and may land him in jail. An equal extreme of altruism, however admirable it may be morally, may be no better adapted to the demands of a society which assumes that each individual will have some concern with his own interests. The man who gives away all his possessions to the poor is likely, in our civilisation, to end in a workhouse if he escapes confinement in a mental hospital.

7. Dissociation of Personality

Janet first pointed out that the various symptoms of hysteria—anaesthesias, imaginative production of symptoms of illness, insufficiency for life's tasks, somnambulisms, etc—might be attributed to a splitting up of personality whereby some part of mental life was taking place without the usual control by the Ego¹²⁷. To such splitting up of personality the name *dissociation* has been applied.

Its most extreme form is *multiple personality*, which is found in some hysterical patients. In multiple personality there seem to be, controlling the same body, two or more personalities, each with different memories, a different character, and different thoughts. These different personalities may be in control of the body at different times, but there is also evidence that one personality may continue to have an independent train of thought while another personality is in control of the body.

The best-known example of multiple personality is Morton Prince's patient Miss Beauchamp, who came to him suffering from well-marked hysterical symptoms²². She developed, during his course of treatment by hypnotic suggestion, two personalities which he called B I and B IV, which alternated spontaneously, and a third mischievous personality whom he called "Sally", who sometimes had control of the body when B I and B IV were absent but also seemed to go on existing co-consciously when either of these was in possession.

B I and B IV were parts only of the complete personality of Miss Beauchamp, which had been split up at a certain stage of her life. Each was incomplete. B I was inhibited, scrupulous, and unhappy. B IV, on the other hand, showed good health but was egotistical and lacking in social and altruistic feelings. Neither of them had any memories in common except those of the period of Miss Beauchamp's life before the splitting took place. The original personality of Miss Beauchamp was got back by a combination of B I and B IV, and a personality was then obtained possessing elements of character which each dissociated personality lacked, and possessing the memories of both B I and B IV.

We only apply the name "multiple personality" to those cases of dissociation in which the dissociated part is itself so well organised that it would be recognised as a personality by another person. There are lesser degrees of dissociation; in *fugues*, or wandering states, the amount of organisation of the dissociated part is less than in multiple personality, and still less in *somnambulisms*.

A person suffering from a fugue commonly lives like a tramp, sleeping out of doors, whereas a typical somnambulist walking outside would certainly be taken in charge by a policeman as showing such abnormal disability that he could not take care of himself. Both Miss Beauchamps, on the other hand, were able to earn a living, and probably did not seem strikingly abnormal to acquaintances.

True multiple personality apparently sometimes occurs spontaneously (as Ansell Bourne, whose case is reported by William James¹³³), but it has been much more commonly produced accidentally as a result of hypnotic treatment.

Miss Beauchamp, even before treatment, showed complete amnesia of an incident connected with her sexual life which occurred immediately before her illness, and her character formation at that time suggests abnormal dissociation of the impulses connected with sexuality. She was not yet, however, a multiple personality. It was when, under hypnotic treatment, the dissociated part of her personality was able to function independently

that it became organised in such a way as to have the character of a separate personality. For normal persons, and most hysterics, such independent organisation of dissociated elements of personality never takes place. They may be said to have subconscious mental processes but no subconscious personalities.

CHAPTER VIII

THE TRANSFORMATIONS OF BEHAVIOUR TENDENCIES

1. Some Social Problems of Behaviour Tendencies

The strength of drive behind certain behaviour tendencies produces practical problems for the educator, the legislator, and the psychotherapist. This is sometimes referred to as if it were a problem of redirecting the energy behind human instincts. This, however, is to consider the problem too narrowly. Acquired behaviour tendencies may also drive the individual to behaviour of a socially undesirable kind. If a youth is inclined to commit robbery with violence, it is no less a social problem if this behaviour peculiarity is due to, let us say, resentment against a domineering father than if it were to be attributed to an unusual strength of the acquisitive instinct.

If patterns of behaviour are socially undesirable, the first problem is to suppress these patterns of behaviour by building up attitudes incompatible with them. This is a task for education in the widest sense, not only education in school but also the social influence exerted in the home and by the social standards of those whom the individual meets and respects. If suppression of undesirable patterns of conduct does not take place by these means, conformity to the requirements of society may be enforced by more active means. The sanctions of any organised society include punishment for offences against its accepted norms of behaviour. There is a general tendency for people to be over-optimistic about the possibilities of punishment to induce conformity to social norms amongst those showing undesirable patterns of behaviour. This method often fails in its object and must be replaced by a method of psychotherapy which aims at a more lasting alteration of the personality of the non-conforming individual. This also is not always successful, although it does succeed in eliminating socially undesirable patterns of behaviour amongst some who have shown themselves resistant to the effects of punishment.

Suppression of undesirable patterns of behaviour is not, however, the sole means of adapting behaviour patterns to social requirements. Most drives have also modes of expression in behaviour which are regarded as socially desirable. Thus the expression of pugnacity in willingness to take part in warfare for

one's country is a social asset to a state which needs an army for its defence. This mode of expression of pugnacity is carefully fostered by the military training of schoolboys, part of which training consists in the development of martial attitudes. The prestige of the military profession is also raised by the use of brilliant uniforms and by the conferring on its higher ranks of titles of respect. The directing of aggressive tendencies into this channel is thus made easy by training, and attractive by the marks of social approval given to it.

The total suppression of a tendency with a strong drive behind it may be difficult, and may be accomplished only at the cost of serious mental disharmony to the individual in question. On the other hand, it may be comparatively easy to find a substitute activity in which the drive finds an outlet in a harmless or a desirable way. Thus a group of boys who band themselves together and fight neighbouring groups in the streets may be given a substitute activity by organising them as a football team. An individual who finds that the effort to abandon the habit of smoking imposes an intolerable strain on him may find the change relatively easy if he substitutes for smoking the chewing of gum.

We may use the general term *transformation* for all the changes which take place in behaviour tendencies as a result of social prohibition or encouragement. For that particular kind of transformation which consists in finding substitute outlets for the energy behind a tendency, we shall use the term *deflection*.

2. Canalisation

Canalisation is the name we give to the least drastic of the forms of social control of individual tendencies. When a widely flowing river is artificially confined within narrow banks, it is said to be canalised. In the same way, a tendency may not be allowed free expression in all ways but be tolerated only on condition that it is restricted to some part of its possible behaviour. Thus the soldier is allowed to exercise his pugnacity against the enemy but not against his comrades. His aggressiveness, or pugnacity, is canalised. Social approval is given to sexual behaviour provided the object of it is a man's lawful wife only. Acquisitive behaviour is approved provided that it takes place within the limits of lawful business activities and does not take the form of swindling or picking pockets.

3. Repression

The importance of substitute activities in promoting harmony of mental life has been emphasised by the psychoanalytic theories

of Freud⁹⁷ He taught that the root cause of the mental disharmony of psychoneurosis is the failure of tendencies belonging to the sexual system to find adequate expression in behaviour Such tendencies, for example, as the infantile passionate love for the mother, which he believes to develop in the early years of the male child, may persist and find no permissible outlet in behaviour Through the tendency of the mind automatically to adjust itself so as to exclude painful contents, such an urgent unfulfilled conative tendency, or *wish*, tends to pass out of consciousness altogether, and out of the control of the self It thus becomes, as it were, an autonomous element in the personality which can influence behaviour but is not recognised by the individual concerned as a motive force and is not under his control Such a dissociated conative tendency is said to be *repressed*

Since one of the characteristics of a repressed tendency is the patient's unawareness of it, Freud says that such a system is *unconscious*, or that it belongs to the system of *the Unconscious* Both the term "repression" and "unconscious" are liable to lead to misunderstandings "Repression" is commonly understood in popular speech to have the meaning that Freud gave to the word "suppression", *i.e.* preventing people from doing what they want to do Thus the proposition that neurotic disorders are due to repression is popularly understood to mean that people become neurotic through being prevented from carrying out in behaviour all of their impulses This is far from Freud's meaning, and modern parents who allow their children to use bad language and wreck the furniture lest they should become neurotic are misunderstanding the implications of Freud's theory of the origin of psychoneurosis The term "unconscious", on the other hand, does not come into conflict with any popularly accepted meaning, but it too has implications that may lead to misunderstandings The essential characteristic of what Freud means by the Unconscious is not that it is not conscious—a property it shares with all dispositions as distinct from processes—but that it is a system of dispositions whose processes are actively barred from the field of consciousness This would be better expressed by such a term as "inaccessible", suggested by Broad, but the term "unconscious" is now too firmly rooted in the theoretical language of psychology for its replacement to be possible

The importance of the concept of repression in connection with the social problems of transformation lies in the fact that if repression is the root cause of the mental maladjustments which produce mental disease, then the hope of cure or of avoidance of these diseases lies in the redirecting of the energy of drives into socially

desirable channels. This is a problem not only of avoiding or curing psychoneurosis but also of avoiding or curing delinquency. The essential step in curing psychoneurosis by analysis is the bringing under conscious control of repressed behaviour tendencies and the subsequent redirection of their energies into socially useful channels. To this process Freud has given the name *sublimation*. Exactly the same problem of sublimation arises when the energy of the repressed system gives rise to delinquent behaviour, although practical means of uncovering the unconscious causes of delinquency are somewhat different and in some respects more difficult than in the case of psychoneurosis.⁴ These will be discussed further in Chap. XVIII.

4. Deflection

Sublimation is a special case of the more general process of finding a substitute outlet for a suppressed drive. For this general process we may use the word *deflection*. The psychoanalytical use of the word "sublimation" is for a socially desirable deflection. Thus Freud says "They [the sexual forces] are sublimated that is to say, their energy is turned aside from its sexual goal and diverted towards other ends, no longer sexual and *socially more valuable*"⁹⁷ (The italics are mine).

It is clear that the introduction of a judgment of social value into the definition of a term makes that term of doubtful validity in scientific psychology. A deflection is not of essentially different psychological nature by being socially desirable. A man who deflects his sex instinct after a disappointment in love by playing beautifully on the violin may be said to be sublimating it, since his mode of expression is socially desirable because it gives pleasure to other people, but clearly it is exactly the same psychological process as would be his activity if his disappointment led him to play badly on the bagpipes. To the man who hates all music, playing well on the violin may seem to be as socially undesirable as playing badly on the bagpipes. It is plainly an ethical and not a psychological question whether a particular kind of behaviour is or is not socially desirable. Much confusion would be saved if we abandoned the word *sublimation* as a psychological term and spoke of all redirections of drives as *deflections* whether we thought them desirable or not. It remains, of course, practically important that we should aim at making deflections socially desirable. Ethical considerations must come in when we consider what alternative channels should be provided for a delinquent boy's energies.

The conception of deflection implies an extension of our idea of the relationship between a drive and a tendency. If energy

belonging to the sex drive can activate musical composition, scientific research, and so on, we must suppose that a particular drive is not indissolubly linked to a particular tendency but may, within limits, be diverted to other tendencies. The ease of diversion may depend on the resemblance between the new and the old tendency. Probably a deflection takes place most easily when the new tendency is closely related to the old, although under this condition the redirection of energy may be less stable.

Let us suppose that a homosexual man wishes to rid himself of the temptation to overt homosexual behaviour by deflecting his energy. To advise him to devote his energy to the organisation of Girl Guides would be useless, for the suggested deflection would not enlist the energy from his repressed impulse. He might make a successful deflection by organising Boy Scouts because this new channel of behaviour is closely related to the original tendency but, for this very reason, the new activity may be an encouragement for the drive again to activate the old tendency that he is trying to suppress. In every attempted deflection a balance must be made between these two requirements, a sufficient resemblance between the two tendencies for successful deflection to take place but a resemblance not so close that the new tendency reinforces the old.

Although we may use such terms as *transformation* and *deflection* for the change of direction of instinctive (i.e. innately determined) tendencies, an acquired tendency may also be subject to this process. The terms therefore do not imply the innateness of the tendency to which they are applied. Freud, for example, believed that passive algolagnia or masochism (sexual excitement by the infliction on oneself of pain) is due to a transformation of active algolagnia or sadism, which he believed to be an innate tendency.⁹⁷ Masochism itself may, nevertheless, be sublimated. Similarly, a strongly developed drive towards aggressive behaviour must be deflected into socially desirable channels. It makes no difference to this social necessity that the aggressive tendency may be the result less of an innate tendency than of a reinforcement of aggressive impulses through the experiences of the individual earlier in life.

The term "sublimation" was originally used by Freud for socially valuable deflections of tendencies belonging to the sex instinct. It is true that the drive behind sexual behaviour is particularly liable to require an outlet in substitute forms of behaviour since it is strong and persistent and is very commonly subjected to partial or complete suppression. Persistence of drive and partial suppression are not, however, confined to the sexual tendency, and the conception of transformation may be applied to other behaviour

tendencies. Thus the transformations of self-assertive tendencies have been studied by Adler,² and Bovet has written an acute study of the transformations of the aggressive tendency, or fighting instinct.³ Before any of these authors had written, William James had suggested the necessity for finding a substitute outlet for the aggressive tendencies which could no longer usefully be employed in war, and suggested that in voluntarily accepted poverty such as that of the ascetic saints we might find a life heroic and pugnacious enough to give satisfaction to the aggressive tendency.^{1 6}

Deflection of the aggressive tendencies may be considered to be taking place when a man finds an outlet for these by fighting against the forces of nature in mountaineering,^{*} or by fighting against the forces of evil in the religious life, or by fighting against war as a pacifist. Perhaps part of the importance of competitive games in social life is that they provide a harmless outlet for aggressive tendencies. Even the most military state cannot employ all its males permanently in warfare, so there must generally be a partial suppression of their pugnacity. The competitive games engaged in by armies in peace-time, and by civilians, not only keep their bodies in fit condition for war service but also serve the psychological function of giving an outlet to their innate aggressive tendencies from which they can be diverted, when the need comes, to actual warfare.

When we ask how we are to obtain conclusive evidence that one behaviour tendency is a deflection of another, there seems to be no altogether satisfactory answer. This relationship is often asserted on very flimsy evidence or none at all. Two lines of evidence seem mainly to be relied on: first, that of some resemblance in character or in associated symbolism between the original and the deflected tendency, and, secondly, that of an inverse relationship between the intensities of activity of the two tendencies.

The first kind of evidence has been most commonly used. Religion, for example, is a channel into which many unsatisfied tendencies may be deflected. Sexual symbolism in religion, and

^{*} It may not be obvious why mountaineering should be regarded as a fighting sport. Bovet gives an interesting example of a mountaineer describing his sport in martial terms: "This amphitheatre is formed of La Maya, Mont Dolent, the Aiguilles Rouges, the Tour Noir, and Darrei which unite in a wall the better to bar the way, and which brutally rend the azure with their gigantic battlements. One would say that it was their mission to defend the approach to the white solitudes which stretch on the other side. From time to time boulders leap down the great couloirs, wait a little, and as it were a trial-avalanche rolls down anon all is silent, and this circle of giants remains there, terribly immobile, regarding you expectantly. Then—most insignificant and delicate little being, made only of flesh and blood—you arrive in the presence of these walls of granite and ice, and you oppose to them, it would seem, something yet stronger and more indomitable than themselves."¹⁸⁸

the use of the language of sex-love in describing the relationship of the soul to God, particularly common amongst the mystics, have been put forward as evidence that the sexual tendency is a source of energy for religious activity. Similarly, there is much in the language and symbolism of religion which suggests a redirection into religious channels of the infantile feeling towards parents.

The martial symbolism of early Christianity, and of the Salvation Army, has suggested to some psychologists that aggressive tendencies have also been deflected into the religious channel.

The most satisfactory evidence, however, that any particular behaviour tendency is a deflection from some earlier tendency would seem to be that of the second kind. This kind of evidence would require that an inverse relationship should be observed between the activity of the two tendencies. If it is true, for example, that a young man devoted to playing the piano is deflecting his sex tendencies, we should find that the playing of the piano decreases the urgency of his sex needs, and that when he is sexually satisfied the urgency of the impulse to play disappears. This would plainly not be conclusive, since there is a limited fund of energy for all activities, and to justify the statement that the piano playing was a deflection of the sex tendency it would be necessary to show that the inverse relationship between his piano playing and sex activity was greater than that between these and any other tendencies such as his aggressiveness or his playing at draughts.

The hypothesis underlying the concept of deflection is that the energy behind some forms of behaviour is derived from that belonging to some other form of behaviour which is suppressed. In other words, a kind of behaviour *A* motivated by a drive is prohibited and this prohibition leads to a state of tension unpleasant to the individual and disturbing to his capacity for adjusting himself to the demands of life. If, however, he engages in certain other kinds of behaviour *B*, this state of tension is diminished and he is happier and better-adapted. Moreover, the fact that the suppression of *A* caused tension is a reason for the energy with which he pursues *B*. It should be clear from what has been said above that there is no simple means of direct verification of this hypothesis. On the other hand, this is true of many psychological hypotheses and we have no reason for supposing that the hypotheses which are of most value in understanding and controlling behaviour are necessarily those that are easy to verify. It is sometimes necessary to decide on the value of a hypothesis by an act of judgment made on the basis of observations in a wide field of behaviour which gives us only a probable opinion as to the validity

of the hypothesis. We may then accept the hypothesis tentatively as a guide to action without complete conviction of its validity. It is, I think, reasonable to claim that the hypothesis of deflection has this claim to acceptance: that its expectations are justified in practice. We are acting on it when we get a delinquent youth to join the Boy Scouts or a youth club, or when we advise an over-anxious individual to take up social work. The judgment of those who give such advice is that it works: that engagement in one type of activity relieves stress due to drives to undesirable activity of similar forms. When such advice is given, the advisers are making use of the hypothesis of deflection.

5 Sexual Regulation and Cultural Achievement

An attempt to justify the hypothesis of deflection in the field of anthropology has been made by J. D. Unwin.²⁸⁹⁻²⁹⁰ Freud believed that all civilisation has been built up as a result of the deflection of energy derived from the sex tendencies by the social imposition of regulations limiting permissible sexual behaviour. If this is so, there should be a direct correlation between the cultural achievements of a society and the severity of its sexual prohibitions.

Unwin has classified the cultures of eighty uncivilised societies in accordance with their religious rites as *deistic* in which temples are erected, *manistic* in which there are no temples but some kind of post-funeral attention is paid to the dead, and *zoistic* in which neither are temples erected nor post-funeral rites carried out. He claims to find an invariable correlation between the degrees of culture as above defined and the amount of pre-nuptial restriction of sexual freedom permitted in the society. Those societies and only those which have permitted complete pre-nuptial sexual freedom, apart from the requirements of exogamy and the prohibited degrees of relationship, have been in the zoistic condition; those and only those which have compelled an irregular or occasional pre-nuptial continence have been in the manistic condition; those and only those which have insisted on pre-nuptial chastity have been in the deistic condition.

Unwin laid down the general law: *The cultural condition of any society in any geographical environment is conditioned by its past and present methods of regulating the relations between the sexes.* It is to be noted that the evidence for the methods of regulating sexual relations is the existence or non-existence of legally enforced penalties for sexual irregularities. Pre-nuptial chastity is regarded as proved if, and only if, proofs of virginity were demanded from a bride.

He also distinguished a higher stage of culture called the *rationalistic*, attained only by a few civilised societies. Civilised societies which are not rationalistic may be completely deistic, or deistic with a rationalistic statum. In such societies pre-nuptial chastity is taken for granted and cultural differences correspond to degrees of freedom in post-nuptial sexual relationships. The highest degree of that social energy which produces cultural advancement is shown by those peoples who have adopted absolute monogamy, in which both partners in marriage have confined their sexual activities to the other. A lesser degree is shown by those adopting absolute polygamy, in which the female partner only is thus confined, and still less in modified monogamy or polygamy, in which neither partner is completely confined to the other. He traces the history of the civilisations of the past, showing that changes in their social energy and their consequent cultural achievements followed changes in the severity of the restrictions placed on their post-nuptial freedom after an interval of about three generations (or about a century). For some reason it seems to be the sexual freedom of the women rather than that of the men which is correlated with the loss of social energy.

If Unwin's theory is true, it offers a clue to the understanding of the process of cultural change and suggests ways in which this process might be controlled. It also has the rare merit of being based on an induction from all of the available evidence. Its very importance makes it necessary to examine critically its foundations. The most doubtful point seems to be the assumption that we can infer a group's sexual behaviour from its sexual regulations. It is possible that a community which has no prescribed penalties against pre-nuptial sexual intercourse may not be, as Unwin assumes, one in which such conduct is common, but rather one in which it is rare or unknown, while the imposition of severe penalties may mean that pre-nuptial freedom is becoming common. That this is the case seems probable on analogy with the relationship between other offences and the presence of legal penalties.

If this were the case, Unwin's evidence would indicate a necessary relationship between the condition of culture and the penalties imposed for sexual freedom but not with restriction of this freedom. A possible interpretation would then be that an increase in what Unwin calls the "energy" of a society might be itself the cause both of cultural advancement and of a breaking through of previously accepted sexual prohibitions necessitating stronger legal enforcement of them. This would be a much less important conclusion. It is also necessary to remind ourselves of the danger of inferring, from the existence of a correlation between *A* and *B*,

the conclusion that *A* is the cause of *B*. It may be so, but alternatively it may be that *B* is the cause of *A*, or both *A* and *B* may be effects of some third factor *C*. Thus, while Unwin's observations are consistent with the hypothesis that cultural achievements are caused by sexual prohibitions, they are also consistent with the hypothesis that sexual prohibitions are a result of the achievement of a high level of civilisation, or that some factor such as increased energy of a society has two effects, causing both a rise in cultural level and also the imposition of more strict sexual regulations.

6. Objectification, Subjectification, Idealisation, and Platonisation

There are four more kinds of transformation of minor importance distinguished by Bovey.¹⁰ The first of these he calls *objectification*. This is the change which takes place when a man satisfies his tendency by watching the action to which it normally leads instead of taking part in it. Aggression is objectified by the child or man who looks on at fights instead of fighting. The fighting play of children does not always take the form of playful fights with their comrades, but sometimes of playing with toy soldiers or organising mock conflicts between other children. The lead soldier serves the purpose of this objectification in play of the fighting tendency. The watching of gladiatorial combats and boxing matches is a similar objectification. The objectification of the sexual tendency is found in the *voyeur*, who can obtain his gratification only by watching, not by actually taking part in sexual behaviour.

Like other kinds of transformation, the sociological importance of objectification is that it can provide a socially harmless substitute for otherwise objectionable activities. The child is allowed by its parents to play with lead soldiers, and is not allowed to fight with its friends. The adult man is allowed to watch a boxing competition, but not to engage in rioting.

Subjectification is the name given to the turning of a tendency on to the subject himself instead of on to an outside object. In the objectification of aggressive tendencies, one watches other persons receiving blows, if the aggression is subjectified, passive algolagnia develops and the subject desires to receive blows himself.*

Humility, submission and devotion, voluntary subjection, flagellatism, and masochism, are instanced by Adler as effects of

* This is Adler's explanation of passive algolagnia. It is altogether different from the Freudian explanation of it as a compensation phenomenon resulting from repressed sadism.

this phenomenon.² Auto-erotism would seem to be a similar subjectification of the sex tendency.

Subjectification is of psychopathological interest and not of direct social importance. None of its manifestations are ordinarily socially encouraged. It is socially more desirable that the fervent ascetic should scourge himself than that he should employ his weapons against other people, but, if this is really a redirection of the aggressive tendency, at least we must admit that it is possible to find other modes of expression of greater social value.

The word *idealisation* may be used of a special kind of deflection in which the object to which the tendency has been redirected has no material existence but exists on the ideal plane only. Thus, while the mountaineer has a material object for his pugnacity in the mountain, the Salvation Army, fighting against moral evil, has an opponent existing on the ideal plane. Love also may be given to an ideal object instead of to an actual person. In this case the sex tendency may be said to be idealised.

In idealisation, the object towards which the transformed tendency is directed is not a physical one. In *platonisation*, there is a physical object, but the behaviour itself undergoes the same change as takes place in the object in idealisation. The word "platonisation" is taken from this mode of transformation of the sex instinct—platonic love. Platonic love has a real sex object but has lost the physical sexual behaviour. Its love behaviour is entirely on the mental or ideal plane. Similarly, one can have pugnacity against a real opponent without an external physical contest. The example taken by Bovet is the playing of chess. There is a real opponent in chess, but the fighting is on the mental plane. Intellectual controversy is a platonisation of the aggressive tendencies rather nearer to the primitive pugnacious behaviour than the playing of chess, and one could trace a continuous series (through political controversy and boxing-matches) between the completely platonic fighting of the chess player and primitive physical fighting.

Platonisation (in varying degrees) is an important mode of disposing of certain instincts, for it is capable of providing what is generally useless but entirely unobjectionable behaviour in place of instinctive behaviour socially undesirable. Two old gentlemen playing chess are of little direct value to society, but at least they are not doing the harm to the social organisation that they would if they exercised their instinct of pugnacity in brawling. Similarly, platonic lovers do nothing for the increase of the race, but they do not undermine established social conventions by immoral behaviour.

CHAPTER IX

HUNGER, FEAR, AND SEX

1. Hunger

Different behaviour tendencies play very different parts in the pattern of behaviour underlying a social system. Hunger is generally recognised as one of the dominant driving forces behind all human activity. No one will doubt that this is the case, yet amongst a very large proportion of a civilised community acute hunger and the strong and unpleasant affective stress associated with it are never experienced. The man goes to work, his wife buys and prepares his food and both eat meals regularly before the tension of the unsatisfied hunger drive has become acute. They have built up a system of habits conditioned by the pattern of their cultural environment such that the unpleasurable tension of real hunger experience need never be experienced.

It is in this sense that hunger is a dominant driving force behind their activities. They need not experience it and they need not even think about it. It is in the background as a possibility if the man stops working or his wife stops buying food. There are many reasons for the continuance of these habit systems, but this background threat of hunger is the most important.

The fact that hunger is a driving force behind the behaviour of most men in civilised societies and yet need not itself be experienced may be expressed by calling it a *closed motivational system* as distinct from the *open motivational system* of sex, the behaviour of which is not organised in this way. In this fact is probably to be found the reason for the sex drive being regarded as the prime disturber of mental harmony, not because its impulses are more important or more urgent than those of hunger but because the affective tensions arising from them can be less easily avoided by a suitable organisation of behaviour.

In many primitive communities and amongst some social classes in civilised communities, life is not so organised that the direct experience of hunger can be avoided. From time to time the tension of the hunger drive becomes actual and compelling, and food-seeking behaviour is an urgent response to this actually experienced tension and not merely a means of preventing it from becoming actual. Then it does become a disturber of mental harmony no less than sex, people living under famine conditions

show behaviour disturbances arising from hunger tensions not unlike the psychoneuroses attributed to sex tensions in our own way of life

There are few more important differences between different societies than that between those in which habit systems can be so arranged that the tension of hunger never becomes actual and those in which activity is spurred by real shortage of food. In all communities the basic economic problem is that of securing sufficient food for its members, but in the first kind of society this basic problem has been so satisfactorily solved that many other incentives determine activity and the members of the society are able to pursue cultural activities, such as art and science, not directly connected with the attainment of food, while such activities have little attraction for those who are living under the lash of recurrent hunger.

When the situation is such as to maximise the hunger drive, this tends to become prepotent over most other behaviour tendencies. If no food is taken but all the water that is required, apparently the hunger drive does not persist at great strength after the first day or two. The maximum strength of hunger drive is to be found if food is taken at intervals but insufficient in amount to appease the pangs of hunger. In populations suffering from famine this condition is very generally fulfilled, and under these conditions it is very commonly found that food-seeking impulses take precedence over the system of social and altruistic tendencies on which ordinary social adjustments depend. Although there are accounts of heroic self-sacrifice under conditions of prolonged hunger, these seem to be exceptional. Sex love seems commonly not able to compete with abnormal strength of the food-seeking drive under conditions of famine, and, in some cases at least, even the stronger drive of parental love seems to be overcome.

A similar order of prepotencies of drives is found in experimental work on rats, in which the strengths of different drives were estimated by the frequency with which the rat would pass over a grid which gave him an electric shock when he was acted on by various incentives. The strongest drive was found to be the maternal, with hunger, thirst, sex, and the exploratory drive, following in that order.

Fasting, *i.e.* complete or partial voluntary abstention from food, is very commonly found as a religious obligation. Partial abstention is generally an ascetic practice whose object is to attain voluntary control over the hunger drive and the consequent character modifications which result from its deflection (not, I think, the mere strengthening of the capacity for voluntary choice, as William James

supposed¹³³) Total abstention from food appears to lead to great imaginative productiveness and is used in various religions, such as Shamanism, for the artificial production of visions. Little or no experimental work has been done on this interesting result of fasting. Apparently a similar result may follow from even partial abstention from food. A philosopher, insufficiently fed in a war prison camp, produced several sonnets every day, although he had written none before and felt no inclination to do so after he returned to normal feeding habits.

Food and drink are primarily means of satisfying hunger and thirst. They play, however, a much larger part in social life than this. They may become the centre of rituals which serve a religious or social purpose, and may be the objects which are given as gifts or used for economic exchange. Many different behaviour tendencies may thus play a part in the activity of eating and drinking. The dinner party in our civilisation is not primarily a method of satisfying hunger but is a social rite which cements comradeship within a social group and may also serve as a social display of the wealth of the host.

2. Fear

Fear, like hunger, is in civilised communities, at any rate in time of peace, an almost completely closed motivational system. The emotion of fear as a response to danger is rarely experienced by the civilised individual. Yet the potentiality of a fear response is present in the background as a motive for much human behaviour. We do not fear motor vehicles on roads or the system of police and judges and prisons, in the sense of actually experiencing the emotional tension of the fear drive in connection with them, except on very rare occasions. Because these things exist we have built up habit systems of avoidance, and so long as these habit systems are functioning effectively we avoid both danger and the emotion of fear.

I have said that fear as a response to danger is rarely experienced by the civilised man. This does not mean that the fear itself is necessarily a rare experience to him: it may be a very common one. There are other sources of fear than danger situations, and many people are made miserable by fears which have some other source. All such fears may be called *neurotic fears*. The word *anxiety* is very commonly used for this purpose, as the English translation of the German *angst*, but in its ordinary use "anxiety" implies a mildness of affective tone which is not necessarily a characteristic of neurotic fear.

Neurotic fears are found in childhood, and most children suffer from nightmares or outbreaks of neurotic fear during sleep during the years about the age of five. It has been suggested that the mastering of neurotic fears is one of the central emotional problems of childhood. Freud has explained fear as the recurrence of the experience of being born,* and attributes the occurrence of neurotic fear to the repression of any other emotional disposition, particularly that of sex.⁷ Neurotic fear has also been explained as due to the formation of conditioned fear reflexes.

As in the case of hunger, we can distinguish two very different relationships of a society to the danger situations producing fear. There are those, like our own settled condition of society, in which actual danger experiences producing strong fear are very rare, being almost entirely successfully avoided by habit systems which have that end. There are others in which danger from wild beasts or enemies may intermittently call out strong emotions of fear, which are the direct causes of escaping behaviour. In some primitive societies this is a more or less normal condition, and a very small breakdown in our settled civilisation, such as war or revolution, is all that is needed to reinstate it amongst ourselves. Civilisation, which has built for its favoured members a protection against occasions for hunger and normal (non-neurotic) fear, has not removed these occasions very far from possibility.

There seem to be certain characteristic reactions to this situation of frequent activation of the fear tension. The natives in many parts of Africa are surrounded by both real and imaginary dangers. The fear tensions aroused by actual danger seem to have the power of creating objects for themselves in the form of hostile spiritual influences. Fear enters to some extent into most religions either by creating safeguards against fear or by creating spiritual causes of fear. The latter are relatively rare in the religions developed in societies whose members are protected against dangers, but may recur when they are exposed to physical dangers over a prolonged period so that intermittent fear tensions are regularly experienced. In this way Davenport explains some of the pathological characters of the camp meetings amongst the American settlers who were moving into previously uncolonised parts of the United States.⁸² Indians and snakes provided real danger, and

* An interesting suggestion which should be easily verified or refuted by observation since those who were delivered by Caesarian section should not later have the ordinary experience of fear. Freud, however, rules out this possibility of verification by saying that these will also have the experience of fear "since it is deeply ingrained in the organism through countless generations." This assumption makes the hypothesis unverifiable and almost meaningless.

the fear tendency activated by these things was ready to respond to the supernatural terrors of Hell

Habitual exposure to situations calling up strong fear is unpleasant and leads to undesirable psychological and social consequences. On the other hand, the fear reaction of the sympathetic nervous system and endocrine glands, if not too strong or continuous, is stimulating and has pleasant after-effects. It may even be physiologically beneficial. Our bodies may not be adapted to complete absence of the fear impulse.* Many of the play activities of adults, such as climbing, skiing, and sailing, may owe much of their attractiveness to the stimulating effect of an excitation of the emotional mechanism of fear which is not sufficiently powerful to be disagreeable. The ideal play activity of this order is one which combines sufficient excitation of the emotional mechanism of fear with the minimum of real danger of injury or death. The attractiveness of the prospect of war and revolution to some of the young is largely owing to the craving for the experience of fear. Actual war is an unsatisfactory way of satisfying this craving, leading to much injury and death and often to the arousal of fear to an extent which is neither stimulating nor pleasurable. It is better that those who have this craving should find a harmless outlet for it in aeroplanes or motor-bicycles or in other serious or playful fear-exciting activities.

The role of fear as a factor in social organisation is much exaggerated by those, like Hobbes, who attribute socialised conduct mainly to fear.¹²¹ Hobbes believed that animals had social instincts but denied these to man, and thought that the instincts of men were such as to lead them inevitably into a war "of every man against every man." There certainly is, in every civilised community, a system of laws, enforced by punishment, restricting the liberty of every man to pursue his own ends at the expense of his neighbours. These laws are not, however, the only forces making for socialised conduct in a community. They merely reinforce social attitudes, partly acquired and partly based on inborn tendencies to conform to social requirements. Amongst primitive communities these attitudes may play so much the larger part in producing social conformity that criminal deviations from accepted social requirements are relatively rare so there is little law and few punishments.¹²⁴

* This is merely a suggestion for physiological research. The same may be true of the tension of hunger. Our ancestors who fasted and feasted may have been living in a way closer to that for which our digestive systems were adapted than our own way of moderation and regularity in feeding habits. "Moderation in all things" may not be the essential rule for efficient bodily functioning except in old age. It is possible that most people profit from occasional extremes—satiation, hunger, and fear.

Civilised rulers of primitive people generally regard it as their duty to enforce a code of conduct which is not the traditional one of the people and which therefore is not supported by existing social attitudes. So it happens that they bring as one of the first gifts of civilisation a system of penalties of great severity, and there tends to result an unhappy approximation to the condition of rule by fear.

3. Sex

Another of the basic human drives is that of sex, whose characteristic emotion is called *love* or *tenderness**. The sex drive itself is organised as part of a large system which includes the impulse to mate, to care for young, and the reciprocal tendency of the young to form attachments to their parents. Drives belonging to this system also provide a considerable part of the motive force behind other behaviour tendencies such as acquisitiveness and pugnacity. This whole system may be called the *reproductive system*.

It has been argued by biologists that the impulse to mate is not the same as the impulse to reproduce, since reproduction takes place without mating early in the evolutionary scale and the first activity analogous with mating is the union of two individuals which is occasionally observed amongst primitive organisms which reproduce in some other manner. This may be true in biological history and should warn us against treating the drive to mate and the drive to reproduce as necessarily identical. Nevertheless, they have acted together for so long that they have become inextricably entwined in human psychology, and their appearance as separate drives, although found amongst some individuals, is exceptional.

It was at one time supposed that the mating of most animals was promiscuous and that sexual restrictions amongst men were an artificial check placed on an innately promiscuous sex tendency. More careful observation of animal mating has shown that this view is untenable. Some mammals are polygamous, but promiscuous mating is not common. Permanent monogamy is found only amongst the higher animals. It is also important to notice that, contrary to a common opinion, permanent monogamous mating is often found amongst animals living in herds. Alverdes gives as examples of this gorillas, probably chimpanzees, rabbits, and probably such gregariously breeding birds as herons, penguins,

* If we use the word "love" for a sentiment, the term "tender emotion" may conveniently be given to the emotion which is commonly called love. In popular speech the same word "love" is given both to a sentiment and to an emotion.

sea-gulls, etc.¹¹ Other animals, as for example horses, are polygynous but not promiscuous. It is to be noted, moreover, that monogamy within a herd is to be found amongst the animals most closely related to man, so it is probable that so far as man's sexual behaviour is innately determined, it is likely to be in the direction of monogamy.

When we speak of animals as permanently monogamous, however, this does not mean that infidelity is unknown. There are obvious difficulties in observing gorillas and chimpanzees in the wild state, so I do not think that we have any evidence as to whether or not they are occasionally unfaithful to their mates. It has been found, however, that male rabbits indulge in accessory promiscuity, copulating with unmated females.¹² Observers have also observed extra-marital mating amongst birds (grebe) which is resented by the permanent mate.¹³ The presence of social prohibitions of breach of monogamy amongst monogamous human societies is therefore to be taken as evidence that the tendency to monogamy is not absolute rather than that it does not exist.

One of the reasons for the earlier belief in animal promiscuity was that it was stated to have been observed amongst captive animals. The conditions of captivity, however, probably produce profound changes in animals' behaviour tendencies, and, similarly, the conditions of the social life of civilised man may be less favourable to monogamy than his earlier state.

The psychological reason for monogamy is that a sentiment of love tends to be produced for a particular person and this sentiment, being reinforced by the emotions generated in the act of mating and by those of parenthood, tends to endure. If it were absolutely permanent and if its effects were to inhibit altogether all possibility of sexual response to any other mate, man would be completely monogamous. In fact he is incompletely so. In monogamous societies there are therefore social and legal sanctions against breach of the monogamous relationship. Polygyny is also a common pattern of marital relationship (polyandry much rarer). Polygyny may be confined to chiefs, and may be an essential source of their prestige and wealth, as in the Trobriand Islands.¹⁴ In some cases commoners have more than one wife. Probably in many cases of polygyny the husband is mating with only one wife during any period of time, although all his previous mates have legally the status of wives. Biologically, this would be a state of impermanent monogamy.

Thus, while it is probably true that there is much in man's inborn nature which favours more or less monogamous unions, this predisposition is not so strong that it cannot be overcome by

a social tradition of polygamy, or even so strong that it will maintain absolute monogamy in a monogamous society without the added force of social sanctions

While promiscuity is not the marital pattern of any human society a large measure of pre-nuptial freedom is sometimes found. In the Trobriand Islands, for example, sexual play is found amongst the children, and as soon as they are old enough to mate, they form impermanent unions¹⁸⁵. There is no social disapproval of unmarried people sleeping together, although there would be strong disapproval of their eating together, which would be a symbol of marriage*. These impermanent unions lead ultimately to the choice of a life-partner with whom a monogamous union is formed and a family is founded.

Thus amongst these people the institution of marriage is rather a means of assuring a stable family than of regulating the sexual life of its individual members. The ensuring to the children of the membership of a closely knit and stable family is probably the prime reason for a society interfering with the freedom of its members to mate as they please. If however, Unwin's hypothesis of the relationship of sexual regulation to cultural achievement is a true one, there is also the important result that this interference leads to an increase of social energy with consequences both desirable and undesirable²⁹⁰. If increase of social energy is a result of social restriction of sexual activity, this has undoubtedly not been intended by the societies imposing these restrictions but must be regarded as a by-product of prohibitions imposed for other reasons.

In many civilised countries at the present time there is a tendency for pre-nuptial sexual freedom to increase. This has been justified both on the ground that trial matings before marriage increase the chance of a satisfactory choice of a life-partner, and also that the unresolved tensions resulting from sexual deprivation are a potent cause of neurosis. Both the impermanence of many marriages and the high incidence of neurosis are serious social psychological evils and any proposal which may have the effect of lessening them deserves the serious consideration of the social reformer. The hypothesis of Freud and Unwin must, however, also be considered. It may be that the liability to neurosis is the price that civilised man must pay for his cultural advancement.

Another very important restriction imposed by societies on the sexual freedom of their members is the prohibition of incest and

* Thus the Trobriand Islanders would be as shocked at a mixed party of rambles eating sandwiches together as are the Christian missionaries at the Trobriand bachelors' houses at which unmarried young people sleep together.

the requirements of exogamy. With certain exceptions, such as the royal families of ancient Egypt, brother-sister marriages are prohibited and also marriages with a large number of other persons who have certain relationships of kinship²⁰⁶. In some cultures the people are divided into two exogamous *moieties*, of each of which any member can only marry a member of the other moiety. In others, as amongst many tribes of Australia, they are divided into four or eight *septs* and any male member of any one sept is required to marry a female of some particular one of the other septs.

There has been much speculation about the reason for these restrictions. The obvious explanation that primitive man was trying to avoid the evil genetic effects of inbreeding is now generally discarded, partly because the geneticists have pointed out that there are no necessarily evil effects of inbreeding and partly because any effects of inbreeding would be too long in appearing to be an effective check on incest. Requirements of exogamy do not prevent marriage between blood relations, since, even in a community divided into eight septs the permitted wife may be a cousin. Less commonly, a large community may be *endogamous*, no marriage taking place between one of its members and an outsider, although this restriction is a less binding one than those of exogamy. Endogamy is easily to be explained as a result of the tendency of social groups to become segregated. There is, for example, a strong tendency for different social classes and different religious bodies to form endogamous groups within our own culture. Still stronger is the endogamous tendency amongst different racial groups within the same area. Thus the whites and blacks in the USA and in South Africa remain on the whole sharply distinct groups because there is a strong social pressure on the members of each group to choose a mate from inside that group.

Since all explanations of exogamy must be speculative, there is no reason why we should not add a new speculation. If members of small groups in a large society choose their mates from within their own small group, the result will be the segregation of each small group into a separate class. Such segregation is a source of weakness to the larger social unit of which these groups are parts. It is clear that exogamy will check this tendency to segregation, and perhaps that is its essential social purpose. The segregation between different social classes in Great Britain would be much reduced if every peer were compelled to marry an actress, every professor had to choose his wife from domestic servants, and so on. This would mean that occupational classes would become exogamous groups instead of having a strong tendency to be endogamous. The greatest disunion in a society through the

formation of segregated groups would take place if all families became segregated through always marrying their own members. This may be an explanation of the universality of the prohibition of brother-sister marriage. It also may be an explanation of the occasional relaxation of this prohibition (such as the brother-sister marriage of the Pharaohs), since in a ruling family social segregation is desired.

4. Abnormalities of Sex

In addition to the transformations of the sexual tendencies which are the results of social requirements, there are a number of spontaneous abnormalities both in sexual objects and in sexual behaviour. Such are *fetishism* (in which sexual feeling is only called out by some object or a normally indifferent part of the human body), *sadism* (in which it is called out by the infliction of pain, or by a phantasy of inflicting pain), *masochism* (in which sexual feeling shows similar dependence on pain inflicted on oneself), and *homosexuality* (in which the object of sexual feeling must be a person of the same sex). These abnormalities are generally called *sexual perversions**.

The sexual perversions produce a number of practical problems in social psychology, on the whole probably less serious than is commonly supposed. In all forms of sexual abnormality, all or a large part of the sexual energy of the individuals affected by them is drawn into other channels than the reproductive. This is not, however, in itself a serious matter since the total number of individuals affected is small compared with those whose sexual energies drive them to reproductive behaviour.

Social disapproval of any sexual abnormality tends to be strong. Less than a century ago, for example, sexual intercourse between men was punishable by death, the penalty is now ten years penal servitude. While there is no legal penalty against homosexual behaviour which stops short of sexual intercourse, social intolerance of the mere disposition is also strong and is itself a practical social psychological problem.

There is no evidence that these powerful social and legal sanctions serve any useful purpose. Homosexuality is probably a condition partly determined by an innate predisposition and partly acquired. There is no reason for supposing that its frequency is lessened either by legal penalties or by social intolerance. In other countries, such as the Scandinavian, where social tolerance is

* This word unfortunately lacks the emotional neutrality desirable for a scientific classificatory term. Homosexuals, in particular, have a very reasonable preference for being described as "inverts".

greater, it does not appear that the condition is any commoner in some communities, as the Zuni Indians,²³ there seems to be complete social tolerance of homosexuality, and marriage between two men is a recognised social institution. Such marriages are relatively uncommon.

There are several different conditions in which sexual desire appears for members of the same sex. Some of these are only passing phases either of a particular stage of development (the *bisexuality* of the adolescent) or of the response to an abnormal social environment (the so-called *acquired homosexuality* which develops amongst men in barracks or prison camps when they are living in close contiguity isolated from women). The true homosexual has a lasting sexual preference for members of his own sex which persists after the bisexual stage of adolescence is past. True homosexuality exists amongst men in two forms. The commoner form is that of *object homosexuality*, in which the active role in sexual relations is desired. In *subject homosexuality* the passive or feminine role is desired and there is often a noticeable femininity in physical appearance. This form may be innate,⁸¹ object homosexuality is probably acquired in the same way as an obsessional neurosis—according to Freud as a consequence of abnormality of infantile emotional development. There is no reason for supposing that the incidence of either form is reduced in consequence of legal or social severity directed against homosexuality.

More serious are the social problems of a sexual abnormality which leads to behaviour of a very undesirable kind. A certain number of murders, and probably a large proportion of the atrocities which occur during wars and revolutions, are the results of the sexual abnormality of *sadism** or the taking of sensual pleasure in the infliction of pain. Many people with a tendency to this abnormality make a satisfactory sublimation of it or indulge it only in phantasy and lead blameless lives. The tendency is, however, sufficiently common to be a real danger when after a social upheaval, the persecution of a political minority is regarded as a public duty. Many of those who would otherwise have made harmless sublimations find themselves able to indulge their sadistic impulses freely against political opponents, and this freedom is used with results horrible both for their victims and for themselves. Tolerant understanding and psychotherapeutic treatment are as necessary to the person with sadistic impulses as to one with any other behaviour.

* There is an unfortunate tendency for those under the influence of Freud to use the word "sadism" for all cruel behaviour and even for all aggressive behaviour. That usage leaves us without a word for the sexual perversion in which cruelty gives sensual gratification, while applying the word we need to other types of conduct for which we already have suitable words.

abnormality, but there is no social end the attainment of which can justify the release of the forces of sadism

The social psychological problem of the sexual abnormalities is the same as that of all temperamental deviations from the common standard of a society. Every society has a certain pattern of approved behaviour. Individuals deviating through temperament or attitude from the approved form find a certain difficulty in fitting themselves into this pattern. If there is severe conflict between their own inclinations and the conduct socially required of them, the resulting stress may seriously affect their social efficiency and be an important factor in precipitating mental disorder. No society can have unlimited tolerance for deviations from its accepted pattern of behaviour. Our own society cannot, for example, tolerate such behaviour deviations as violence, murder, or rape, without sacrificing the reasonable ends of happiness and security for its members. The limits of a society's tolerance of deviations may, however, not be determined in reality by any such reasonable considerations. Widely developed hostile attitudes with strong emotional force may exist against socially harmless deviations. The real social problem is then not that of getting rid of the deviations but of inducing a reasonable measure of social tolerance of them.

5. The Parental Behaviour System

A system of drives which leads animals to care for their offspring is found almost universally amongst the higher animals and is not uncommon amongst the arthropods, insects, etc. The parental behaviour of different animals is, however, very varied. Some animals, such as the cuckoo, have no parental behaviour beyond that of depositing eggs in a place adapted to the needs of the young when they hatch out. Amongst some fishes the parental tendencies are developed entirely by the male, for example, the male stickleback guards the nest and remains with the young ones for a short time after they are hatched, while the female has no concern with them at all after she has once laid her eggs. Amongst many kinds of birds the function of sitting on the nest and caring for the young is distributed equally between the male and female.

Amongst human beings the parental system of drives is generally supposed to be strongest amongst women. It is indeed very probable that it is only amongst women, and amongst them possibly only during the period after birth, that there is a strong system of parental drives resulting from internal secretions. On analogy with results obtained by Wiesner with rats,³⁰⁴ it appears likely that lactation itself is not productive of this maternal drive, but

undoubtedly the emotional experience of feeding the child at the breast increases the mother's tender attachment to it

If we call this system of drives the "maternal instinct" it must particularly be remembered that the part of maternal behaviour which is in any sense instinctive is simply the persistent energy which drives the mother to tender, protective, and self-sacrificing behaviour on behalf of her child. Her maternal instinct gives her no precise information about how the child's interests can best be advanced, nor any instinctive impulsion towards the behaviour that is best for it*. Mothers who endanger the health of their children by giving them infected milk from dirty vessels, or those who lay the foundations for later neurosis in their children by systematic over-protectiveness, may be moved by a maternal tenderness as real and as instinctive as that of mothers who are better informed as to how to achieve the well-being of their children. The driving force may come from an innate propensity, but the most effective means of attaining the ends of the parental behaviour tendency must be learned.

Parental love does not, of course, depend entirely on the strong drives which exist in the mother soon after birth. These form the foundation for sentiments of parental love which remain powerful sources of energy. Although it is only in the mother that this physiological foundation exists, parental tenderness may also be strong in men. It may be indeed an accident of the form of our pattern of culture that love of children is very commonly attributed to women only†. In our civilisation, care of children is commonly undertaken exclusively by women, but this is not true in all cultures. In the Trobriand Islands, for example, the father takes care of the children after weaning, and their later debt of gratitude to him is regarded as his reward for taking them in his arms and for cleaning them when dirty¹⁸⁷.

The parental tendencies have always been admitted as sources of altruistic modes of behaviour and of disinterested emotion. Hobbes, for example, who denied the innateness of the social tendencies in man, admitted altruistic behaviour as an original response within the system of parental behaviour¹²¹. Even if we regard it

* Such instinctive direction of maternal behaviour certainly is to be found lower in the animal scale. Yerkes reports, for example, an orang-utan mother who, when her newly born child had difficulty in breathing, performed the correct action of inflating its lungs by breathing into its mouth³¹⁰. This apparently was an unlearned (or instinctive) response, but it is doubtful whether any human mother would have done this unless she had been instructed to do so.

† In support of this view, Margaret Mead has shown that amongst the Arapesh people of New Guinea whose pattern of culture does not standardise this sex difference, there is no difference in the amount of parental tenderness shown by mothers and fathers¹⁸⁸.

as originally derived from the parental system, altruism is not confined to responses within that system even amongst animals¹⁵⁷ and very obviously not amongst men. It now appears as one of the general characters of social behaviour.

6. Behaviour Tendencies of the Child in the Family

It is curious that the classifiers of human instincts have distinguished a mating instinct and a parental instinct but no filial instinct. Yet the behaviour system of the child in relation to its parent is no less an acquired system of behaviour based on an original innate pattern than is the behaviour system of the parent to the child or of the parents towards each other. The credit of rescuing from neglect the problem of the child's relations to its parents belongs to Freud, and his treatment of this subject forms the central core of psychoanalytic theory.⁹⁷

The conception to which Freud attaches the most importance is that of the so-called *Oedipus complex*—the system of emotional attitudes of the small boy towards his parents, which includes a passionate and jealous love for his mother (a love which, according to Freud, is sexual but not yet genital) and also the opposite attitude of hatred for the father as his rival for the mother. After a latent period, from about five to adolescence, a new phase of sexuality appears in which it begins to take the adult form of genital sexuality and seeks for an object outside the family circle. At first relatively indifferent to the sex of the love-object, who may also be as much as twenty years older than the adolescent himself, this new form of the sex tendency afterwards typically becomes centred on a member of the opposite sex of an age not very much different from the youth's own. The typical form of the development of the love life of girls is considered to be similar, an *Electra* attachment to the father being accompanied by jealousy of the mother. The situation may, however, be complicated by a simultaneous or alternative passionate attachment to the mother with jealousy of the father.

This stage of passionate attachment to the parents is regarded as important to future life in various ways. First, neurotic patients very commonly show evidence of a failure to pass beyond the stage of passionate love (and hate) for the parents to that of love for an outside mate, and many of their peculiarities are due to the repression of an Oedipus complex. Secondly, the kind of mate chosen is stated to be influenced in various ways by the character of the parent whose place he or she is to take. Thirdly, attitudes towards religion and towards those in authority are said to be largely determined by the earlier emotional attitude towards the parent, thus

a man may be conservative because his early respect for his father is transferred to the king or other person in authority, or a revolutionary because his early attitude of rebellion against his parents is transferred to these parent substitutes. Delinquency also may have its roots in a deflected resentment against the parents which takes the form of rebellion against authority as represented by the law. It is a striking fact about juvenile delinquents that in the majority of cases they come from homes in which the normal relations of affection between the parents themselves, or between the parents and children, are in some way disturbed. Lack of parental love seems to be a powerful factor in the production of delinquency.

Earlier than this stage of passionate devotion to either or both parents, Freud distinguishes a stage in which the sexual impulses of the child are directed in ways similar to those of adult sexual pervers. This he calls the stage of *polymorphous perverse sexuality* and he believes that the adult sexual pervert is simply one whose sexual impulses, while having the adult character of genital sexuality, have otherwise reverted (or *regressed*) to some phase of this early infantile stage. Thus the young child biting at the breast is said to be "sadistic", and the adult sadist is regarded as showing the abnormality of obtaining sensual gratification in a way which was normal to him in very early childhood.

Although this statement of the emotional development of the child in the family obviously still needs scientific verification, it is probably the best guide to this problem that we have at present. In trying to assess its scientific value, we must avoid the error of attaching undue weight to purely verbal questions. The use of such terms as "infantile sexuality", the "Oedipus complex", and "sadism", are open to obvious objection since all are likely to be misunderstood as implying a maturity of sexual development which no one supposes to exist in the young child. When Freud speaks of "sexuality" in young children he means an emotional attachment similar to and continuous with the sexual love of the adult. But there is also something discontinuous in sexual development and the new element which comes in at adolescence is indicated by Freud as "genital sexuality". Whether we shall call the stage started at adolescence "genital sexuality" or "sexuality", and whether we shall call what precedes it "sexuality" or "pre-sexual affection", is plainly a verbal question. Whichever usage we adopt, we must admit that there is both an element of continuity and of discontinuity between the adolescent and the pre-adolescent affections. If, however, we wish not to be generally misunderstood, it will plainly be preferable not to use the Freudian terminology.

This danger of misunderstanding might be avoided while the idea of continuity was emphasised by coming a new phrase for the child's early love tendencies. I suggest the term *protosexuality*. Similarly, we might use the term *protosadism* for those aggressive impulses of the young child called "sadistic" by Freud. This term suggests what is really meant by Freud, not that the impulses are identical with those of the adult sadist, but that they are the primitive dispositions out of which adult sadism may develop.

It must be remembered that the characteristic course of a child's emotional development in the family situation may be less an unfolding of an innate propensity than a response to the particular family situation in which he finds himself. The typical family described by the Freudians is generally one in which the mother is the tender protector and the father a stern disciplinarian. But not all mothers are tender or all fathers stern. Malinowski has pointed out that in the Trobriand Islands the father has only tender relations with his sons and the mother's brother is the disciplinarian.^{18,2} Amongst these people the Oedipus complex takes a characteristically different form, hate reactions being directed against the mother's brother and not the actual father. Equally wide differences in the family situation exist within our own culture, and the typical family of the Freudians is only one of many forms of the family situation. A full knowledge of infantile emotional development will necessitate a comparative study of the effects of different family environments.

Many important practical questions are raised by this view of the emotional development of the child. What family situation best fits the child for the kind of social adjustment which he will later require? To this question the psychoanalysts have not given any certain answer. There are obvious suggestions of dangers to be avoided. If it is true that a sentiment of hate may develop against one parent, it is obviously undesirable to intensify that tendency. Particularly the analysts of children have found that the observation of sexual intercourse between the parents is likely to have bad effects on emotional development.^{11,9}

Are there also dangers from the undue intensification of the sentiment of love for either parent? That an adult neurotic may remain in a state of infantile attachment to the parent and be unable to transfer this love to a suitable mate may well be true without implying that the cause of the neurotic condition is that the neurotic patient as a child loved the parent too much. It is possible that a too strong emotional attachment to the parent might in some cases make more difficult the emergence from this attachment into the condition of adult love, but there is no reason

for supposing that the normal mother whose love impulses are sufficiently satisfied in her sex life and whose tenderness for her children discharges itself in the work of taking care of them, will be tempted to make such demands on their affections or so to stimulate them by excessive caressing that she will harm their emotional development by keeping them in a state of emotional dependence on her. She is more likely to harm them if she is persuaded to withhold those expressions of affection which the child needs for his own reassurance and to keep active his own love for her. On the other hand, the neurotic mother trying to compensate for emotional dissatisfaction in her own sex life, who tries to make the love of her children compensate for the love which she feels is denied her elsewhere, may make demands on her children which are disturbing to their emotional development.

The lack of parental love is at least as dangerous to the mental well-being of children as an excess of it, and it is much more common. The analysts of children find that children frequently suffer from anxiety lest they should lose the love of their parents, and reassurance on this should be given by physical expressions of love.¹¹⁹ It has also been pointed out how very much children brought up in institutions suffer in character development from the absence of the emotional relationships that exist within the family situation.¹²⁴ In modern institutions an attempt is often made to compensate for this by providing an adult who will have the same love relationship to the child, so far as is possible, as would a mother.

A few years ago mothers used to read a book by J. B. Watson which led them to suppose that all caressing of children by their mothers was harmful and that consideration for the psychological well-being of their children required them to abandon it. For this opinion there seems to be no good reason. The caress plays an important part in stimulating love both in sexual and parental activities. It is a complete misunderstanding of Freud's opinion to suppose that he regards strong love between parents and children as harmful. Indeed, he would seem to regard it as essential to satisfactory emotional development. Freud is quoted as having said in conversation "The function of the mother in the life of her son is to teach him how to love." The modern parent who never fondles her (or his) child in the hope that the child will thus be safeguarded from the danger of a fixation of the love impulses in their infantile stage of attachment to the parent, would appear rather to be imperilling the child's capacity to form a strong and lasting attachment when it has grown up.

CHAPTER X

ACQUISITIVENESS AND PUGNACITY

1. **Acquisitiveness amongst Animals**

It has been very often noticed that a dominant motive behind conduct in modern civilised societies is the tendency to acquire wealth or its equivalent in money and to retain it. This fact has sometimes been regarded as one to be deplored and remedied,^{2b, 4} sometimes as an inevitable part of human nature which the economist or sociologist must take account of without making futile attempts to alter. It becomes, therefore, important to attempt to consider how far this acquiring and retaining behaviour is rooted in an innate instinct or *acquisitive propensity* and how far it is an attitude acquired as a result of the high social valuation of material possessions and of the acquisitive attitude towards them.

It is convenient to use the term *acquisitive tendency* to cover both the behaviour of acquiring goods in excess of immediate needs and that of retaining or hoarding them, but not the behaviour of acquiring an article for immediate use. Thus a dog burying a bone may be said to be showing acquisitive behaviour but not a dog helping himself to a piece of meat which he is going to eat immediately afterwards. Evidence as to how far human acquisitiveness is based on a tendency that is innate might be drawn from its appearance in the animal world, from its appearance as a play activity in childhood, from its appearance as a crude and ungraded tendency in mental disorder, or from the universality of its appearance amongst all races of mankind. Let us see what these different lines of evidence have to contribute to the solution of the problem.

Amongst animals we find hoarding, primarily of food for future consumption. Examples are to be found in the hoarding of honey by the bee and the burying of bones by the dog. The biological purpose of these examples of hoarding is obviously the provision of food for future use, but it should be noted that bees store honey in quantities beyond their needs for the winter and dogs bury bones when there is no shortage in the supply of them. These facts suggest that behind such conduct there is a specific drive to hoard and that this is not merely an adaptation of the food-seeking tendency to a condition of seasonal shortage of the food supply. This conclusion is more strongly borne out by such acquiring of useless objects as is reported by the observers of the conduct of jackdaws and magpies.

Most striking in its apparent resemblance to a part of human behaviour is the acquirement of territory by male birds before the nesting-season. H. E. Howard has made a valuable study of this tendency of male birds of various species to acquire a territory and to fight any male of the same species who ventures to intrude in it¹. The song seems to serve the purpose of warning other male birds that the territory has been acquired and of letting the female know that a male bird is there under the conditions necessary for pairing.

This territory sometimes extends (like that of the cuckoo) to several fields, while the guillemot requires only a few square feet of rock. The territorial acquisition serves, in ways differing with different species, the ends of the reproductive tendencies. For example, such birds as the chaffinch require a speedy supply of food drawn from a small area so that the old birds and the young may be adequately fed without any danger of so long a desertion of the nest as might cause destruction of the young by cold.

A point of particular interest in these observations is the alternation in the male bird between behaviour in which he is gregarious and behaviour in which he insists on this isolation. During the winter he moves about as a member of a small or large group, showing no hostility towards other males and no particular interest in females. Then, at the beginning of the breeding-season, he leaves the flock and establishes himself on an area of ground, on which he tolerates no intrusion either by other individual males or by the remainder of the flock. At the same time he may for intervals desert his own territory and repair to the neutral ground occupied by the rest of the flock, and show his old friendly attitude towards other members of it. Howard therefore concludes that the situation calling out pugnacious behaviour is the standing in his own territory and not merely the development of the sexual organs which takes place at this time.

It should be noted that the territorial behaviour of birds serves the ends, not of the self-preservative but of the reproductive system of tendencies. Similarly, the normal springs of a man's acquisitive behaviour are the needs of his wife and family, and purely self-motivated acquisition is relatively abnormal.

Thus we find analogies to man's acquisitive behaviour in the instinctive behaviour of certain animals. This leads us to the conclusion that there is amongst some animals an innate acquisitive drive, or instinct of acquisition. This observation does not, however, lend much support to the view that man's acquisitive behaviour is also determined by an innate propensity when we notice that the acquisitive drive is not very widespread amongst

the animals and that the examples we have found of it are not amongst near relatives of man. There seems to be little if any acquisitive or hoarding behaviour amongst the higher apes. This last fact is not conclusive against the possession by man of an innate acquisitive propensity, since it is conceivable that this is a difference between the inherited constitution of man and of the apes. Man might owe his cultural superiority over the gorillas, chimpanzees, and orang-utans, partly to the fact that he is an ape with a highly developed innate acquisitive propensity which they lack.

2 Acquisition in Man

The study of animal behaviour gives little support to the view that man has an innate tendency to acquire and to hoard. We may next consider what evidence is to be derived from the study of man himself. The early and persistent occurrence of a line of behaviour as a play tendency in early childhood is one piece of evidence, although by no means conclusive, that the behaviour in question is the product of an innate drive. We find, in fact, that acquisition and hoarding start early amongst children. The psychoanalysts state that the earliest objects collected are excreta and that, as children are discouraged from this, they collect harmless but generally useless objects such as stamps, cherry-stones, beech-nuts, etc. Later this tendency is satisfied by wealth of all kinds (but particularly by the accumulation of money), although they may carry over into adult life the comparatively useless acquisitiveness of childhood and collect china or stamps.

The forming of useless collections is found as an accompaniment of certain forms of insanity, *e.g.* dementia praecox. Excreta also may be collected and treated as objects of value, being given, for example, as a present. In these phenomena the behaviour of acquisition is showing the regression to an infantile form characteristic of the progress of dementia.

On the borderline between the sane and insane manifestations of this tendency we find the miser. He collects the same objects as normal persons—wealth in the form of money—but his acquisition has lost its relation to the primitive needs of food etc., for it is relatively ungraded, and his real biological needs may suffer in the pursuit of it. There seems to be good reason for regarding the miser's activity of acquisition as a regression to the irrational collecting of the child, and this regression is stated to be associated with particular strength in early years of the dirt-collecting tendency (*anal-erotism*).

Similar to the behaviour of the miser, and probably also similar in origin, is the hoarding of trivial objects found as an element in

the character of otherwise normal persons. Persons of undoubted sanity are frequently met with who seem incapable of parting with any object, however trivial, which has once come into their possession. Old theatre programmes, notices of meetings, empty boxes, and invitations, are retained with a useless persistence which bears witness to the strength of the acquisitive tendency even when its activities have been deflected from their primary biological end.

The acquisitive motive acts with very different strengths in different cultures, and amongst some peoples it seems hardly to be present. Rivers has said, for example, that amongst some of the peoples of Melanesia there is no private ownership except of such objects, *e.g.* weapons, as a man makes for himself.²³³ Canoes are possessed by a family group, and land is generally held in the same way. About such communal possessions there appears to be no quarrelling.

Rivers tells an amusing story of how a party of Melanesians applied his own method of investigation to himself by closely questioning him as to what he would do if he were given a pound. When they discovered that he would not divide it with his relatives they laughed heartily at a line of conduct so different from their own customs.

Malinowski says, however, that it is a mistake to suppose that there is not private ownership of such objects as canoes amongst the Melanesians, although it is an ownership more limited in its privileges than ownership amongst ourselves and more hedged in by definite obligations to other members of the social group.¹⁵¹ He denies that the Melanesian attitude towards property is correctly described as simple communism.

It is probable that neither in Melanesia nor anywhere else is it possible to find an organisation of society which can correctly be described as primitive communism in the sense that the typical acquisitive behaviour of retaining goods as individual possessions is completely absent. The important point of Rivers's observations, however, remains. A culture may exist in which this type of behaviour is so little developed that our own kind of acquisitive behaviour would seem to its members to be altogether irrational. It is not possible to claim that there is such uniformity of acquisitive behaviour of men living in different cultural environments as would in itself be evidence for the existence of an innate acquisitive propensity. Lack of uniformity in acquisitive behaviour is not, of course, evidence against an innate acquisitive propensity, since it is possible either that such a propensity exists in different strengths in different racial groups, or that the strength of acquisitive behaviour depends primarily on environmental influences (on

the social production of acquisitive attitudes) and not on the strength of the acquisitive propensity. If the latter explanation were accepted, the statement that there is an innate acquisitive propensity would be true but of little importance as a principle of explanation in social psychology.

It is, of course, obvious that a great part of the behaviour of seeking and retaining wealth can be explained without assuming any specific drive to acquire, since such behaviour may be explained as due to the operation of other more familiar drives. If a hungry man makes efforts to acquire a loaf of bread, his behaviour is sufficiently explained by the food-seeking drive and needs no reference to a specific tendency of acquisition. If he makes efforts to earn a weekly wage, his activity may be explained in the same way. The earning of the wage is an indirect way of getting food for his wife and family and satisfying his other needs. If he makes efforts to earn money more than is necessary to satisfy his primary needs, this may be explained as due to his wish to satisfy other wants—for motor cars, wireless sets, wines, etc. When we notice that he makes efforts to earn more money than he requires either for needs or for luxuries, and that he does not spend it on goods but puts it into a bank or invests it, we may explain this behaviour by saying that the end he is trying to obtain is future security for himself and for his family.

No one would deny that this explanation of the activity of acquiring money is partly correct. The incentive for the acquisition of money is very largely the satisfaction of primary needs, the desire for luxuries, and the obtaining of security for the future. Many economists consider that this picture of the motivation of acquisitive behaviour is a complete one. It gives a pleasantly rational account of economic behaviour, but there are many things that it does not explain. It is not the case that the intensity of money-acquiring behaviour commonly falls off as the earliest needs are satisfied and that it sinks to zero when the man has a reasonable number of luxuries and adequate security for the future. On the contrary, the effectiveness of the earning of money as an economic motive depends on the fact that the intensity of effort to acquire it does not fall off as more is acquired. It is a want that is generally insatiable. The full-fed animal or man ceases to make efforts to obtain food, but the wealthy man does not cease to make efforts to obtain money.

This insatiability of acquisitiveness is true not only of money but also of possessions generally. The primary need for shelter is satisfied by a very small house, but men acquire large houses and large estates and numerous objects to put in their houses for the

same reason as they acquire large banking accounts—because these things have themselves incentive value and are not merely sought as means to the satisfaction of some other need. It is this insatiable character of the demand for possessions that makes it necessary to postulate a special tendency to acquire and retain possessions which we may call the *acquisitive tendency*. The mere fact of insatiability does not, however, prove that this tendency is inborn.

We spoke earlier of the miser's acquisitive tendencies as being unrelated to his primary needs. From what has been said above, however, it is clear that this is only a difference in degree between the miser and the normal man. Most people in a civilised society have an acquisitive tendency which is in part unrelated to their primary needs. The miser may starve himself so that he need not part with his money, but many other people deny themselves present pleasures and even present necessities in order to save money, not because they have reflected that they need the money for future security but because the impulse to save it is stronger than the impulse to part with it. A further characteristic of the miser is that the object of his acquisitive impulses is normally money and not goods. This also, however, is only an extreme manifestation of a characteristic present in all acquisition. For most people, money has an incentive value for acquisition peculiar to itself.

Unquestionably there are individual differences in the strength of the tendency to acquire and retain money and other possessions. The man of business who has supplied the economists with the typical "economic man" may be one whose acquisitive tendency is relatively strong and persistent in its driving force even after the primary biological needs for food, shelter, etc., have been satisfied. If he is intelligent and fortunate, and has canalised his acquisitive tendencies into those activities which are permitted by the society in which he lives, his efforts will be rewarded by the success of his acquisitive aims.

There are other men whose mental energy is mainly directed through other channels—such as scientists, engineers, explorers, religious persons, etc.—and some, such as collectors, whose acquisitive tendencies are satisfied in other ways than the acquiring of wealth. These show relatively little tendency to make great efforts to acquire wealth further than is required for their needs. It is probable that economists have erred in their estimation of human motivation by taking the successful business man as the representative individual in this respect and attributing to other persons the same strength of acquisitiveness with less ability to satisfy it, whereas it seems more probable that the business man has as a

dominant element in his character the acquisitiveness which is comparatively subordinate in others

There seems to be no sufficient reason for asserting that these differences in strength of the acquisitive tendency are due to differences in strength of an innate propensity. They may be due to differences in the strength of the social influences by which acquisitive attitudes have been built up. The child finds himself surrounded by objects which are "owned" by his parents and other people and finds his rights restricted with respect to them. At the same time there are other objects in which he finds himself invested with similar rights. He grows up in a world in which a possessive attitude is socially permitted and encouraged. Later he recognises the social approval which is given to those who have successfully attained the aims of acquisition, he hears that one man has "made good", *i.e.* that he has acquired money and a large house and a motor car, while he notices the little respect that is paid to one who has failed in this object. There are thus a number of social influences at work in building up acquisitive attitudes. The differing intensity of these influences in different individuals' social environments might account for differences in strength of the acquisitive tendency.

It seems unlikely, however, that these are the only factors that determine the child's development into a more or less acquisitive individual. The ease with which children adopt hoarding habits, the persistence of these habits in spite of parental discouragement, and the tendency of indiscriminate hoarding to reappear as a symptom of mental disease, all arouse the suspicion that the acquisitive tendency is not merely an acquired attitude but is based on an inborn propensity*.

If there is such an original tendency to acquisition, it acts merely as a foundation on which acquisitive attitudes are built. If we wish to understand the acquisitive behaviour of an adult man, it is less important that we should guess that he started with an acquisitive propensity than that we should know the social forces which have built a system of acquisitive attitudes on this foundation. These social forces have canalised his acquisitive tendencies and have probably very much intensified them. The canalisation is seen in the social and legal distinction between legitimate industrial enterprise and theft. A man may acquire money by selling for five shillings a patent medicine which cost him twopence

* Or on a very early transformation of some other tendency. This is the psychoanalytic explanation of acquisitiveness, that it is the transformation of the early interest in and valuation of excreta. Such a mode of origin of a tendency would be difficult to distinguish from an original innate propensity.

to make, but not by removing money from another man's purse. Legal penalties and social disapproval are strong in opposition to theft because theft is the breaking beyond permitted bounds of a behaviour tendency which our society encourages and utilises.

Living under a different pattern of society our acquisitive tendencies might be less strong and canalised into altogether different channels. In communist countries there is the same sort of social disapproval of the activity of a man acquiring an individual fortune by commercial activity as amongst ourselves of acquiring wealth by theft or piracy, and there is no reason for supposing that such a social requirement does any more violence to man's inborn nature than is done by the prohibition of theft. Both requirements are social restrictions on the development of a tendency which probably is based on an inborn propensity. The development of human attitudes and behaviour tendencies is certainly very variable when acted on by different social requirements. It is true of course, that for any social and economic activity to take place, a social setting must be provided which gives an adequate motivation for the required activity. It is a mistake, however, to suppose that the system of motivation to which we are accustomed is the only possible one.

3 Pugnacity amongst Animals

McDougall has included the response of anger and aggression in his list of innate human propensities. There is little doubt that the tendency to angry, aggressive, or pugnacious behaviour is inborn, although, as in all human behaviour tendencies, the details of adult aggressive behaviour are learned responses, the situations calling out aggressive behaviour are acquired in a manner analogous to the conditioning of a reflex, and the strength of the tendency in any individual, although probably partly determined by inborn temperamental factors, is also partly the result of educational and other social influences. We can best approach the problems of human pugnacity by first studying the fighting behaviour of animals.

Fighting-play is an activity which is found among the young of a large number of animals. The most usual kind of activity amongst puppies is playful fighting, which occasionally degenerates into struggles of a more serious kind. Groos has pointed out that such playful contests are found amongst animals which are not aggressive towards members of other species, as well as amongst the beasts of prey¹⁰⁸. If we accept his theory that play is rehearsal for the serious activities of adult life, it seems to follow that such play is essentially a preparation for adult fighting between animals.

of the same species and not merely for aggression against other species

Such fighting between adults of the same species is a phenomenon widespread in the animal kingdom. It has been very generally supposed to be connected with sexual activities. Some writers have thought that the subjugation of the female by the male primitively takes the form of a contest, and that courting is a later refined substitute for the crude physical combat.

A form of contest which has been more generally regarded as of importance, however, is the struggle between males of the same species for the possession of the female. These struggles are common about the mating season, the female is supposed to give herself to the victorious male. The prevalence amongst some male animals, *e.g.* stags, cockerels, etc., of fighting weapons not found in the female suggests that these kinds of fighting may have played a part in the evolution of some species.

There are, however, other kinds of fighting which clearly possess no sexual significance. As an instance we may take the combats between cows for leadership, described by Baud-Bovy²⁰. This struggle takes place each year in the pasturages of Thion towards the end of June or in the first days of July, when the herds arrive on the high pasturages. It has great practical importance, for the victorious animal is recognised, not only by the herdsmen but by the cows themselves, as "queen" of the herds. The queen, whose functions last during a whole year, has the privilege of walking at the head of the herds, and this privilege extends also to the herd to which she belongs. This herd goes before the others, and so gets the best of the pasturage.

On 2nd July 1902 M. Baud-Bovy saw the fight at Thion. "From all sides", he writes, "appear the herds, the cows, with extended muzzles and tossing heads, emit violent and unwonted bellows. In order to avoid too serious injuries, the horns of the cows are slightly blunted. Soon rapid engagements have taken place, young beasts who had over-estimated their strength, after some unfortunate encounters, have retreated humiliated to the ranks." One magnificent cow overcame three adversaries in turn. After each victory she bellowed until some other hitherto victorious cow answered her challenge. These were also defeated by her or retired without fighting as if sure of defeat. Finally, she engaged the queen of the previous year, and threw her on to her knees. After showing a little more resistance the old queen was driven from the field and the victor was left alone, proudly throwing out anew her challenge.

Howard maintains, moreover, that fights amongst birds are not dependent on the presence of the female but are normally for territory¹²⁵. They are practically absent when the birds are together in the gregarious condition in the flock. A fight takes place when another bird settles on territory which has been appropriated already, and the fight is abandoned when he is driven off. Generally a male is fighting a male, but a male and female together may fight another pair, or a male and female together may attack a single female, or even a single female may be seen to attack another female. Sometimes the male will engage one by one the individuals of a flock which has landed on his territory. Fighting also often occurs between members of different species brought into competition by requiring the same nesting conditions—for example, the raven and the peregrine or buzzard, the moor-hen and lapwing, thrush or starling, magpies and wood-pigeons, etc.

4. Aggressive Behaviour amongst Children

Aggressive impulses are found very early amongst children. Some observers consider that the infant biting at the breast is showing the first aggressive behaviour. Very early the emotional behaviour pattern of anger with kicking and random striking with the hands is a characteristic response to restriction. Not much later, the same pattern of response is found in the temper tantrum which it is difficult to attribute to any particular kind of external situation. Before the end of the first year, definite blows may be directed against a person who has removed a desired object or given other cause of offence. Blows may be exchanged between children in a more or less earnest fight before two years of age. It is noticeable, however, that fighting play is found much less amongst children than amongst such animals as puppies. Groos states that it is rarely found before three years of age¹⁰⁸. A great part of the fighting between older children, however, is apparently an activity pursued for its own sake and not with the object of injury to others or the possession of an article fought for. It has, therefore, some of the character of play even when it is earnestly pursued.

These relatively playful contests grade into others of a more serious nature which, although very often entered into for the enjoyment the activity of fighting itself brings, end as serious fights in which real injury is done. A desire for domination appears to be at the root of these children's fights. Bovet points out that teasing is an activity of children which is obviously closely related to the fighting tendency³⁰. Children, he says, do not fight because

they are teased, they tease in order that they may fight. Sometimes, however, teasing, instead of leading up to a contest is substituted for it. This and other transformations of primitive pugnacious behaviour tend to take place when an improvement in manners causes the child to look unfavourably on actual physical fighting.

5. Fighting amongst Human Adults

The close association between fighting and sex observed amongst the animals is found also amongst human beings. Domination of the female by violent behaviour has sometimes been suggested as the primitive form of the marriage ceremony, but the researches of Westermarck seem to have placed beyond doubt the fact that the so-called "marriage by capture" has never been more than an unusual development from peculiar environmental conditions.^{30,3} Fighting between men for the possession of women has, however, been more common. The tournaments of the Middle Ages took place in the presence of women, and often the prize was the possession of a woman. The more highly modified forms of pugnacious behaviour to be found in present-day competitive games are in a certain measure (although not entirely) displays for the benefit of a feminine audience.

Such contests have played an important part in the marriage customs of some peoples. Westermarck gives examples from Paraguay, California, Australia, and Papua. He quotes the following passage of Hearne about the Northern Indians: "It has ever been the custom among these people for the men to wrestle for any women to whom they are attached, and, of course, the strongest party always carries off the prize. A weak man, unless he be a good hunter and well-beloved, is seldom permitted to keep a wife that a stronger man thinks worth his notice. This custom prevails throughout all their tribes, and causes a great spirit of emulation among their youth, who are upon all occasions, from their childhood, trying their strength and skill in wrestling."¹¹⁷

Actual physical struggles without sexual significance are, of course, also found amongst men. Men may quarrel about any object they value as well as about the love of a woman, or merely for the satisfaction of their self-assertion. Except for the highly conventionalised combat of the duel, however, these disputes do not generally lead to actual physical fighting amongst civilised men except under conditions of regression to primitive modes of behaviour. Such regression takes place sometimes under the influence of alcohol, and drunken men often fight readily. A similar regression appears to take place after severe hardship, such as

occurs during an exploration. Without any stimulus from feminine onlookers, exploiters appear to quarrel amongst themselves about trivial things in a manner remarkably contrasting with the peacefulness of their behaviour under ordinary conditions. A similar quarrelsomeness has been observed in experiments on the effects of deprivation of oxygen.

6 War and the Aggressive Tendency

It is often said that a reason for warfare is that man is a "fighting animal", that is, that he is instinctively aggressive. There is, however, no reason whatever for supposing that there is any inborn tendency for one national group to make war on another. It is true that many vertebrate animals show more or less aggressive behaviour towards other members of the same species, but none show the behaviour of two social groups endeavouring to exterminate each other. The only animals amongst which war has been observed are the ants. The slave raids of such ants as the *Amazons* closely resemble a certain type of human war. Also it is sometimes found that two neighbouring ant nests of the same species will engage in a communal fight in which vast numbers of ants are killed. This, however, seems to be the only development of this kind of behaviour amongst the animals and to be dependent on the extreme development of the social instincts found amongst the social insects and nowhere else in the animal world.

Not is there any ground for saying that warfare has always and everywhere been present amongst human societies. Perry has pointed out that food-gathering communities in the primordial state were peaceful and that cruelty and violence were rare.²¹⁴ Warfare was an acquired habit which resulted from the circumstances of the development and decay of the archaic civilisation. The peoples of Egypt, Babylonia, etc., underwent a progressive education in violent modes of behaviour. Militias became standing armies, and human sacrifice developed. He also points out that people in the food-gathering stage at the present time are peaceful, and that the education of a peaceful people in violent modes of behaviour has taken place recently in Fiji and elsewhere.

Warfare must not, therefore, be itself regarded as a primitive expression of the aggressive tendency. It is a redirection of that tendency into an activity which is not itself primitive, for the attainment of economic or other ends of a social group or of its leaders. It will hardly be doubted that in primitive warfare with hand-to-hand fighting, the combatants are exercising their aggressive tendencies, and that by fighting they obtain a mental satisfaction whose absence in times of peace is shown by restless

discontent and desire for active service. But in modern warfare the conditions have so changed from those of the primitive battle that, for effective soldiering, the aggressive tendencies of the individual soldier must already have undergone considerable transformation. He may get a fierce primitive satisfaction from occasional hand-to-hand struggles, but more often he is engaged in some manipulative activity which has no immediate connection with killing the enemy, or in long periods of simple inactivity. Throwing bombs from aeroplanes, performing the mathematical calculations necessary in modern gunnery, or standing for weeks or months inactive in a trench, are kinds of behaviour far removed from that of primitive pugnacity.

Although war between nations may appear to be advantageous from the narrower point of view of a single national group,⁺ there can be no doubt that, from the wider point of view of the race as a whole, it is an evil too serious to be tolerated. By an inversion of ordinary natural selection it takes its victims from among the most fit, its damage to life and wealth are such that it is doubtful whether total destruction of our civilisation will not result from a continuance of the appeal to arms for settling international disputes.

There are many obstacles to the abolition of warfare, but the existence of an instinctive tendency to go to war which can obtain satisfaction in no other way is not one of these obstacles. The very great difference between the activities required by modern warfare and those of primitive aggression is probably one of the reasons for the strength of the sentiment against war at the present time, particularly amongst those who have had the experience of combatant service. It has been said that non-combatants obtain satisfaction for their aggressive tendencies on a purely imaginative plane, so that attitudes in favour of war are more easily developed amongst them. This may be true of those non-combatants remote from the sphere of warfare, but those who suffer enemy invasion or air-raids are forced into activities which give little satisfaction to the aggressive tendencies. Taking refuge in dug-outs from bombs dropped by an enemy against whom one can take no action gives less satisfaction to the aggressive impulses of civilians than reading accounts of battles with purely imaginative participation in them. At the present time wars give little satisfaction to the primitive aggressive impulses of either combatants or non-combatants. It

* Even this, however, is no longer true. The economic and biological losses of most of the victor nations in recent wars far outweighed any material gains they achieved, and the balance is much further upset if we consider also the load of mental and physical suffering which they endured.

is in other directions that we must look for the psychological factors favourable to war

These are not innate propensities but attitudes favourable to war which have been built up partly as a secondary result of attitudes of national loyalty and of antagonism to other national groups, partly by social approval of warlike activities and of those who take part in them. In the actual war situation these attitudes are intensified by increased social approval of warlike activities and social disapproval of attitudes not conducive to the successful carrying out of the war. Since war is now a recognised mode of social activity, there is a strong social pressure at all times to maintain attitudes favourable to participation in war if war breaks out. There is no reason for doubting that if war were renounced by the civilised world, other attitudes could be built up and other outlets both psychologically and socially more satisfactory could be found for men's aggressive tendencies.

There is, in fact, no lack of ways of employing these impulses in a manner beneficial to society as a whole. Ignorance, disease, and vice, are enemies demanding all the self-sacrifice, courage, and determined pugnacity, which are at present poured out in the socially useless activity of soaking the earth in blood.

7. Transformations of the Aggressive Tendency

Aggressive behaviour in its most primitive form of mere individual quarrelsomeness is obviously a disposition socially harmful. Success in carrying on life under conditions of complicated interdependence between individuals necessitates some other method of settling individual disputes than resort to violence, and some other satisfaction of man's disposition to pugnacity than by doing physical injury to his fellows. Resort to the law-courts for the settling of disputes is one way by which primitive pugnacity is rendered unnecessary, and, where the provision of this alternative method of obtaining satisfaction is sufficient to stop men from resorting to physical violence, the law also steps in to punish regression to the cruder primitive way of settling disputes.

We have seen that Hobbes imagined that the primitive condition of mankind was a war of every man against every other man, and that a stable social organisation was only obtained by the suppression of this condition by legislation. While this conception of a primitive anarchical war is certainly a fiction, it remains true that a stable social condition can only result from the suppression, canalisation, and transformation, of individual aggressive tendencies. This is well illustrated by the total collapse of a social group which may result from the outbreak of individual pugnacious tendencies.

from their accustomed suppressions. The following example of such a collapse is given by the author of *Arabia Deserta*

"It is a proverb here, that a man will slay the son of his mother for an old shoe-leather. The breach was this: some children disputed for an apple, the strife increased, men rose from the clay benches, men came forth from the thresholds, and drawing to their partialities, every hot head cried down, despised and threatened his contraries. Men armed themselves, and the elders' reverence was weak to appease this strong sedition. Barbarous shoutings were answered with bloody words, they ran apart from both sides to their quarters, and as every man entered his cottage there he shut himself in and fortified the door, then he mounted upon his clay roof to shoot against the next hostile houses. None of them durst come forth more in all that year, for their adversaries would let shots fly at him from their house terraces. Upon both sides they saw the harvest ripen and stand out so long, without reapers, that all their bread was lost, at length also their pleasant autumn fruits hanging ruddy in the orchards, rotted before their eyes. There fell eight beleaguered champions, in eight months, beside some it was said who perished with hunger. In this time many, not partisans, had abandoned Maan, the most went to settle themselves in the Hauian: all the small traders removed to Shemmia—These Eve's sons were lost for the apple at Maan!"²⁹

A stable organised community can only continue to exist on condition that the aggressive tendencies of its members do not lead them to try to dominate each other by physical violence. It has been argued by Bovet that the aggressive tendency has behind it an energy which, if denied one outlet, must be used in another direction if the individual is to attain inner harmony.³⁰ Thus the successful transformation of aggressive tendencies of its members is as necessary a problem for a society as the successful transformation, or *sublimation*, of their sexual energies. The aggressive tendency may be given an outlet in competitive games, in arduous struggles against the forces of nature such as are found in exploration, in mountaineering, or in a struggle against moral evil. It may provide the energy behind the militant enthusiasm of an ardent pacifist, and the lust of intellectual battle may be seen in the eyes of a sociologist hotly contesting against the theory that there is any innate tendency to aggression.

There is, however, one mode of expression of the aggressive tendency which is of outstanding importance for social psychology since it is one of the two principal motives of our own social structure. This is the domination of other people, not by the prohibited method of physical violence but by the socially permitted

methods of economic and social competition—by the purchase of other people's labour and subservience and by the gaining and utilising of the prestige attached to a superior social position

The nature of this struggle is seen in any story of a young man or woman who has started in humble circumstances and has "made good". One aspect of the story is the acquiring of wealth, from being only able to satisfy primary needs, the individual has risen to the position of being able to indulge in luxuries and to accumulate capital. An equally important aspect is the rise from a subordinate to a dominating position. At one time he had to obey orders and to address his superiors by titles of respect, but he ends by giving orders and by being addressed respectfully. He has engaged in a long struggle against others which has ended in their subjugation, a struggle in which he has employed no physical violence, his weapons have been his intelligence, his skill, perhaps in the use of words, the elements of his character by means of which he can impose his will on other people, and, in the later part of the struggle, his money and his economic and social position. It has been a fight, although transformed from the primitive struggle of physical violence. The domination finally achieved is likely to be more satisfactory to the individual concerned than the mere acquisition of wealth.

There are certain problems of individual adaptation which result from the strength of this motive of competition for social domination in modern society. It is an end which, from its very nature, must be attainable to only a few. The remainder suffer from the frustration of an impulse which has been strengthened by social influences and has remained unsatisfied. Unless they have the power of renouncing this unattainable end of dominating other people, they will seek to gratify it in socially undesirable ways (by petty family tyranny, or by a cantankerous attitude towards other people), or it may simply make them neurotic and unhappy.

The evils which result from inordinate love of money are amongst the commonplaces of the moralists. Less attention has been given to the evils which result from inordinate lust for power. It is the merit of the psychotherapeutic system of Adler that he draws attention to the capacity of this factor to destroy happiness and social efficiency.² He sees in all neurosis an attempt to satisfy a frustrated desire for power. By being ill, a hysteric may gain the power of imposing his or her will on other people which exceeds any power that could be gained by healthy activity. His method of cure is to make clear to his patients this source of their symptoms, and to lead them to renounce the unsatisfied desire for power which was making them ill. It is unlikely that this is a complete account

of the origin of psychoneurosis, which probably needs for its full explanation the sexual factors postulated by Freud, but Adler has undoubtedly done service to psychology in pointing out the unsatisfied desire for power as one of the principal sources of unhappiness and social maladaptation. This is, in truth, only a rediscovery of what was believed by the medieval religious teachers who taught that the road to peace was the way of humility and the renunciation of self-love.

8. Our Competitive Acquisitive Pattern of Culture

Every community carries on its life after a pattern determined by the traditional aims which each individual pursues and the incentives which have social approval. These patterns have been called by Ruth Benedict *patterns of culture*.²³

Thus the Zuni Indians of Arizona are ritualistic and conventional. An individual's wealth is used to enlarge his prestige by increasing the importance of the ceremonial role he takes in religious ritual. One who tries to take leadership by his greater power or knowledge is censured. The good man is polite, conventional, mild, and without arrogance. The Dobus of NW Melanesia are treacherous and murderous. Dourness is a virtue, laughter and merriment are avoided. "Suspicion and cruelty are his trusted weapons in the strife and he gives no mercy as he asks none." The Kwakiutl of Vancouver Island practised cannibalism as a religious rite, attaining ecstasy through the repugnant and horrible. Their wealth consisted of goods (blankets, oil, etc.), titles of nobility, and etched copper plates (*coppers*) with a high fictitious value. Social esteem was gained by lavish giving of presents or by destruction of wealth. A person was shamed if he could not return within a year presents of double value to those given him or if he could not destroy as much wealth as a rival. The purpose of wealth was to enhance social esteem by shaming rivals at contests of destruction of wealth (potlatches). Superiority to rivals was displayed by unrestrained self-glorification and ridicule of others.

Thus in three different societies there are three different ideals: mediocrity and conventionality in the first, malevolence in the second, and megalomaniac self-assertiveness in the third. The ideals of each would be misfits in the others. In our own society, the person who conforms to the ideals of Zuni is not uncommon, but he is regarded as a failure and can hope only for a lowly-paid job in which he is used and despised by the more self-assertive members of his society, the ideal Dobu would be imprisoned as a criminal, while the person conforming to the Kwakiutl ideal, if he did not

succeed in becoming a dictator or a successful business man of the predatory type, would probably find himself in a mental hospital

The traditional and socially approved aims which give its characteristic pattern to our own society are acquisitiveness and the transformed aggressiveness which aims at domination over other people by other means than physical violence, *i.e.* by social and economic competition. These are the two aims whose achievement is summed up in our phrase that somebody has "made good". When we say that these are the two characteristic motives of western civilisation this does not mean that amongst ourselves the acquisitive and aggressive tendencies are innately stronger than amongst other people. Very likely they are not. But educational and social training are directed towards the strengthening of these motives, and it is only so far as the individual has learned to react to them that he can fit in easily to the structure of society.

There are many cultures amongst whom the acquisition of a large fortune by a private individual, *i.e.* one who is not a ruler, is not regarded as a socially desirable course of conduct. It may be dangerous to the individual who succeeds in doing it, it may, on the other hand, be impossible for him to succeed. A capitalist organisation of society, however, is one in which it is possible (though generally not easy) for a man starting with few possessions to accumulate great wealth, and a system of laws and a body of police protect him from those who want to take his wealth from him.

Just as in some societies the acquisition of individual wealth is not a permitted motive, so also in some societies the motive of social dominance is not one that can be entertained. If there is a stable ruling social class whose right to dominate is hereditary, those who do not belong to this dominating group cannot hope to attain a dominant position by any effort of their own. In our own society, however, there are various roads to social dominance open to the ambitious. These may hope to become dominant by wealth, by literary success, or by membership of an elected ruling body.

The dominant motives of any pattern of culture are implanted in its members during their childhood. This may be the result of deliberate training or of unintended social influence. It has been reported that amongst the warlike Maoris, the father used to tease and anger his male children until they won his approval by turning and attacking him. Similarly it is reported of the boyhood of a well-known American millionaire that his father used to have small financial transactions with his children in which he cheated them.

as much as he could in order to make them sharp. These were special trainings for culture patterns dominated by pugnacious and acquisitive motives respectively. The giving of pocket money to children from which they make their own purchases and the saving of which is the necessary condition for buying an expensive article are all parts of a system of training for fitting into an acquisitive society.

Still more obvious are the methods of training for responding to the motive of social dominance. Individual competition is widespread in school work and games. The schoolboy is given his place in the order of merit of his class so that he may be encouraged to be top. So also he runs a race in order that he may, if possible, be first. Those he learns to admire in sport are the record-breakers. This is the beginning of a training in the motive of excelling.

Our industrial system is so arranged that, on the whole, the objects of production and distribution shall be attained as a result of the efforts which men make to serve their own individual, or family, ends of acquisition and social domination. In the eighteenth century men could explain this fact by regarding the industrial system as a device of the Creator for deriving "golden conduct from leaden instincts." Now we are more inclined to regard it as a somewhat imperfect adaptation of a system of social institutions to the characters and needs of the people who work within them. If it must be admitted that, on the whole, the ends of production and distribution are attained by the activities of men working for their own gain and advancement, it is also true that these ends are very imperfectly attained and there are many undesired consequences of this organisation of motives.

It is obviously not certain that the man who gains wealth, even by methods socially approved, has done so by activities which advance social well-being. It is true that he may become wealthy by manufacturing an article which satisfies a real need previously unsatisfied. He may, on the other hand, make his wealth by manufacturing a worthless or harmful patent medicine and stimulating the demand for it by misleading advertising. We cannot fairly judge the acquisitive competitive system without noticing that its motives act in such a way that a very large part of men's economic activities are directed into socially undesirable channels.

The concentration of wealth in a few hands and the formation of more and of less privileged classes with respectively more or less of economic advantages and social esteem are also secondary consequences of the free operation of competitive acquisitiveness. The resulting class stratification is a potent cause of social instability.

The majority in any community must be disappointed of their aim to achieve wealth and a dominating social position. Our pattern of culture stimulates both sets of motives in everybody but denies them satisfaction to all but a few. It creates, therefore, a dissatisfied majority.

It is within the limits of our own pattern of culture that the great achievements of civilisation have so far been won. They have been won at a cost of individual disharmonies and of releasing disruptive social forces. Every pattern of culture has probably its own characteristic individual and social difficulties. Whatever changes may in the future be necessary in our own culture pattern, it is plainly the fact that many people lead harmonious and happy lives within the pattern of culture of western industrial civilisation, responding to the acquisitive and social dominance motives without allowing their mental well-being to suffer from an inordinate love of money or of power. Those do so who show the normal response to these motives but who have also the power of renouncing the desire for money and power when renunciation is necessary. To provide adequate incentives for this renunciation is part of the task of religion. It remains possible that a change in our pattern of culture might make the attainment of harmony more easy and reduce the burden of unhappiness and neurosis which weighs on a large proportion of the inhabitants of the civilised world.

CHAPTER XI

LAUGHTER, PLAY, AND WORK

1. Psychological Problems of Laughter

There are two main questions which the psychologist may ask about laughter. First, he may ask what are the situations which call out the response of laughter. Secondly, he may ask what kind of response laughter is and what are its functions. Most of the theories of laughter are primarily attempts to answer the first question. Generally they have been dominated by the conviction that there must be one characteristic common to all situations provoking laughter. Their course has generally been that of taking one laughter-producing situation as the typical one from which a formula may be derived, and then arguing that all other laughter-provoking situations can be fitted into the same formula. The primary data for such theories have been derived from ordinary experience without any attempt at a scientific method of discovering at what objects or situations men laugh and at what they do not.

A typical example of such a theory is that which was put forward by Bergson. Bergson took, as his typical situation at which we laugh, that of a man slipping on a piece of banana skin²⁶. His theory was that we laugh at this because, in falling under the action of gravity, the man is behaving like inanimate matter instead of carrying out the purposive behaviour characteristic of a living being. The function of the laughter is to punish mechanical rigidity or clumsiness of behaviour. With great ingenuity, Bergson extended this explanation to all the variety of things at which we laugh. In the contortions of clowns, the rigid gestures of an inferior orator, and even in witticisms, he traced the same mechanical rigidity as the element which determines our laughter.*

A good deal of ingenuity is necessary, however, to fit these causes of laughter into Bergson's formula of mechanical rigidity, and his explanation of the function of laughter breaks down completely when we try to extend it to these cases. Undoubtedly the theory that laughter is a form of social chastisement is sometimes

* It is not a fair criticism to say that we do not laugh when we see a man fall over the edge of a cliff. Bergson recognised that mechanical behaviour is not the only condition necessary to evoke a response of laughter. It is also necessary that the situation should not call out any very strong emotion.

true. Certain kinds of awkwardness in social relationships are laughed at, and laughter stops them from being repeated. But it is equally true that the raconteur, the clown, and the wit, are encouraged by the laughter of their audience and deliberately try to provoke it. We must distinguish between the laughter of derision and the laughter of approval. Laughter may have the function of conveying to the individual laughed at either social disapproval or approval.

Bergson's formula for the nature of the laughable situation, that it is one in which a human being behaves with the rigidity of inanimate matter, will not bear close examination. Undoubtedly some laughable situations are of this kind but others are not. His method of selecting instances to prove his theory is one that has been widely used by other propounders of theories of the essential nature of laughable situations. It is wholly different from the method of experimental enquiry in which one takes a wide sample of laughable situations without previous selection and then endeavours to discover what they have in common. Even his initial typical situation of the man slipping on a banana skin is very dubious. It is easy for an experimental psychologist to take his notebook out on an icy day and to observe how often the sight of anyone falling down calls out laughter in the onlookers. I believe that this observation has been made and that the laughter response was found to be very rare. I have myself examined the first fifty jokes in a book of jokes. I find that none follow Bergson's formula closely and that only thirteen out of the fifty can with some ingenuity be made to fit into it.

The difficulty of fitting all examples of laughter-provoking situations into any formula can be best illustrated by taking an example.

A man was leaning against the wall of a bank. A policeman saw him and said "What do you think you are doing there? Propping the bank up? Get a move on!" So the man moved away from the wall, and the bank fell down.

This is a funny story. When told under appropriate social conditions it provokes the response of laughter. Yet it does not describe a human being behaving in accordance with mechanical laws. It is rather the wall of the bank that behaves in accordance with the laws of animate objects. Suppose we give it a different ending and substitute for the last sentence *So the man moved away from the wall and fell to the ground*. Now it fits into Bergson's formula of describing a human being acting under mechanical laws, but it ceases to be a funny story.

Other formulae have been suggested as alternatives to Bergson's. J. C. Gregory finds relief as the common quality of all laughter-provoking situations.¹⁰⁶ J. Y. T. Greig finds the essential situation in the overcoming of an obstruction to love behaviour.¹⁰⁷ Piddington takes the situation of embarrassment as the typical one and attributes laughter to two conflicting social evaluations of the same situation.²¹⁷ Freud put forward theories to explain laughter at wit, at humour, and at the comic. The key-word of his explanation in each case is *economy*. The explanation he gives of laughter at wit is that it arises from *economy of expenditure in inhibition*. What is meant by this is that the witticism expresses indirectly, *i.e.* economically, a malicious or indecent idea that would be inhibited from direct expression. He uses parallel formulae of *economy of expenditure in feeling* and *in thought* for explanation of laughter arising from humour and the comic respectively.

Freud's contribution is of value in drawing attention to the importance of socially prohibited tendencies in determining laughter. The improper story, expressing ideas of sex, excretion, or perverted sexuality, makes up a great part of the sources of laughter. The expression of malicious ideas is also subject to a certain amount of social prohibition and escapes this prohibition only when they are indirectly expressed in a laughter-provoking form.

All of these theories draw attention to characteristics of some situations provoking laughter. None of them succeed in accounting for all. There seems no reason for supposing that there is any single formula to be found which will cover all situations leading to laughter. Rather we must regard laughter as a social response serving certain ends and evoked in a variety of situations. What things an individual will laugh at are largely determined by the social traditions of the group to which he belongs, and only to a limited extent by any intrinsic quality of the situations themselves.

2. McDougall's Theory of Laughter

McDougall's contribution to the theory of laughter was primarily a suggestion as to its function.¹⁷⁶ Spencer had earlier put forward the view that laughter was a way of discharging surplus mental energy through bodily activity.²⁵⁸ Its function was to relieve mental tension, and the means employed were unco-ordinated movements of facial muscles and the musculature of the breathing apparatus.

McDougall suggested that the key to the understanding of laughter lay in considering more carefully its psychological and

physiological effects of the behaviour of laughter. He pointed out that it had both the psychological effect of breaking up trains of thought and sustained activities, and the physiological effect of stimulating the respiration and the circulation, raising the blood pressure, and sending a fuller stream of blood to the head and brain. In other words, it produces the physiological condition characteristic of joy, and, by direct action on the bodily system, produces a state of *euphoria* or general pleasurable affect in the mind of the laughing person.

The things at which we laugh were stated by McDougall to be the slight misfortunes of other people, which, through the sympathetic pain they induce, would otherwise have a continually depressing influence on our mental life. These occurrences which, apart from laughter, would have been mildly displeasing and depressing, become occasions of laughter, and this laughter breaks up the depressing train of thought which has been started, and produces pleasurable affect by direct action on the physiological system. Thus we may be considered not to laugh because we are pleased but to be pleased because we have laughed, and the purpose of this being pleased is to avoid becoming unhappy through our sympathetic response to the minor sorrows of other people.

This seems to provide a better starting-point for understanding the nature and purpose of laughter than the conventional discussions of the nature of the ludicrous, although it appears still to be far too narrow to account for the full range of the varieties of laughter. Undoubtedly part of the usefulness of the response of laughter lies in its capacity for saving us from the depressing effects of minor misfortunes. The man who can laugh at minor misfortunes is a happier man and one better adapted to the demands of life than the man who is depressed by them. There does not seem, however, to be any reason for restricting this beneficial effect of laughter to the minor misfortunes of other people. The merry man also laughs at his own minor misfortunes, and the capacity to do so is more profitable to his mental well-being than the capacity to laugh at the troubles of others.

Obviously also it is not a complete account of the causes of laughter. Not all small pains, even of other persons, are ludicrous, it is much funnier to see a man sit on a pin than to see him accidentally prick his finger, even though the pains may be equal. Also we can go through a book of funny stories and find that some are about minor misfortunes and some are not, just as we find when we try empirically to fit all examples of the ludicrous into any of the other formulae that have been suggested.

3. The Social Character of Laughter

A fact which has received insufficient attention from those who have put forward theories of laughter is its predominantly social character. A man laughing by himself is so unusual as to attract attention. Even good jokes read in solitude rarely produce the response of laughter, although much poorer ones excite ready laughter when told in a circle of friends. We may also notice that laughter, when it occurs in a social group, shows a strong tendency to sympathetic induction, the laughter of others is itself a situation producing laughter.

The effect of this laughter in a social group is to cause a temporary cementing of the social bonds within the group. Thus the primary social function of laughter is to increase the response of primitive comradeship within a temporary social group. This cementing of primitive comradeship within a temporary group has as its necessary effect an increase of the separation of the members of that group from any person outside it. Here we find the distinction between the attitude of laughing at and laughing with a person, which Bergson overlooks. If we are laughing with a raconteur or humorist we are including him within the laughing group whose bonds are thus cemented. The laughter of derision, on the other hand, serves the function of excluding the person laughed at from the comradeship of those laughing.

Thus, when men laugh at one of their number who has been guilty of some error of taste or breach of the social habits of his class, this is not so much to chastise the guilty one, as to dissociate the laughers from his error. They show that he is not of their group, and, therefore, that they would not commit such behaviour themselves. We may notice also that in a strongly conservative group the revolutionary is an object of laughter and the expression of even mildly revolutionary opinions by one of the group members is checked by the laughter of derision. Again there is a threat to the cohesiveness of the group which is counteracted by laughter.

The use of laughter for cementing together a group is, of course, known to the orator. There is a rule of public speaking that one should always begin with a humorous anecdote, a rule which some speakers carry out with mechanical rigidity. It is true that cementing of temporary group relationships also results from other kinds of behaviour carried out in common. A speaker might gain his ends by making his audience weep together instead of laughing together. Laughter, however, has many advantages for this purpose. It is more easily produced and more subject to the effects of sympathetic induction than most other kinds of behaviour,

and the euphoria which accompanies it is in itself favourable to the establishment of the relationship of primitive comradeship

A secondary consequence of the social nature of laughter is the fact that the objects and situations arousing laughter are partly determined by a process of social conditioning. Objects and situations habitually laughed at in a social group become, through that very fact, objects of laughter to those who become members of the social group. This fact would itself make it unlikely that we should find any common property of the objects of laughter. Some social groups laugh at a man who slips on a piece of banana skin, some laugh at a hunchback, others do not. An English and a Scots audience laugh at different things. If members of a social group observe that their own objects of laughter do not produce laughter in another social group they are inclined to express this fact by saying that the second group has "no sense of humour". The social psychologist will express this more exactly by saying that the process of social conditioning of laughter in the second group has followed a different course.

4. Conclusions as to the Objects and Functions of Laughter

If it is agreed that the situations calling out laughter are largely determined by the social habits of the groups to which the individual belongs, no simple answer can be expected to the question of what are the characteristics of the objects or situations which produce laughter. On the other hand, some types of situations and objects seem to be more generally accepted as laughable than others. Most noticeable amongst these are physical awkwardness, embarrassment, expressions of malice, certain aspects of sexuality and of obscenity, unexpectedness, verbal dexterity, and incongruity. Some of these are mildly painful and fit McDougall's formula very well. In some cases the painful character of them is due to the fact that they are topics reference to which is socially prohibited. There seems to be no possibility of giving a general formula which will cover all of them without making it so vague as to be valueless. The nearest I have seen to a satisfactory general formula is that given by Max Eastman, who says "Laughter, according to my view, may be a response to any pleasant stimulus, and to any unpleasant one that can be taken playfully"⁷². It must be admitted, however, that this formulation would not be of much use to anyone who wanted a rule by means of which to find out what situations are laughter-producing and what situations are not. It is to be noted that there appears to be a rule analogous to that of summation of stimuli with respect to the ludicrous and that a situation which combines a number of these elements is more

likely to provoke laughter than is a situation in which only one is present

The value of laughter lies partly in the effect pointed out by McDougall of producing a state of euphoria in the individual laughing. The capacity to laugh at oneself is one of the constituents of the personality trait of *self-objectification* mentioned in Chap. VII. In contrast, the *paranoid* individual is commonly solemn and earnest. Since the extreme forms of the paranoid type of personality are commonly very disruptive of any social group and are particularly dangerous to social cohesiveness when they are in positions of authority in a social group, it is important that those who have the responsibility for appointing heads of social organisations (such as schools, hospitals, etc.) should value this quality of self-critical merriment more than the solemn earnestness of the paranoid individual. On the other hand, like most traits of personality, the tendency to laughter may exist in an extreme form in which it ceases to be an adaptive response, and the man who laughs off all situations of emotional stress even when they should be dealt with by strong effort, may be in his own way even less well adapted to the demands of efficient living than the individual who has not available the response of laughter to enable him to escape the depressing effects of minor emotional stresses.

5. Play

Like laughter, play is a method of expending energy which, although certainly not functionless, does not seem to promote any of the ends which we commonly regard as the important ones of practical life—acquirement of food or commodities, escape from enemies, etc.—or indeed of any external goal. In play, the activity seems to be an end in itself, and its biological serviceableness is to be found in the fact that the activities of play bring into action motor mechanisms which will be of serious use in adult life. Young puppies, for example, carry out in play the same activities as they will use later in fighting and hunting: they roll each other over, take each other by the throat, chase each other, but all the time without doing any injury. They are, moreover, doing it with obvious enjoyment.

From the biological point of view, then, play may be described as a rehearsal of activities which will later be put to use in the serious business of life. The young puppy is strengthening his muscles, legs, back, and jaws, upon which he will be dependent in the fighting and hunting of his adult life. On its psychological side, play is an activity enjoyed for its own sake, *i.e.* for the joy the activity itself brings. This is the essence of Groos's well-known

theory of play^{108 109} Groos recognised as play only those activities which satisfy both the biological and the psychological criterion. Playful activity is one which is a rehearsal of an instinctive activity, and it is an activity which is undertaken for its own sake, and not, of course, with the conscious aim of rehearsing useful activities.

The human child shows probably a greater variety of playful activities than any other young animal. He displays, for example, in addition to the fighting and hunting play which he shares with other animals, the activity of pulling things to pieces, which Groos calls *analytical play*.

He also shows *synthetic play*, with toy bricks or modelling-clay, in which he builds up new things. These are clearly rehearsals of the adult behaviour of curiosity and of construction respectively. Later, he may exercise himself in play which simulates adult activities relatively distant from primitive forms of behaviour, as, for example, bartering, and even the carrying out of religious ceremonies.

This function of children's play as preparation for adult life must be borne in mind if we are to avoid the common mistake of undervaluing the importance in mental development of the child's play activities. It is often supposed that a child amuses himself until he reaches school age and then starts the serious business of education. In truth the child is educating himself while he is putting lids on to boxes, putting one block on the top of another, or experimenting in speech sounds, etc. We can do little to help this self-education except providing him with such toys as he needs. The difference that takes place at the school age is not that education starts then but that a stage is reached in which more extensive adult co-operation is needed. Self-education by suitable toys may, in fact, be carried on even after the school age has started. The apparatus used in the Montessori system is, in effect, a set of toys devised for teaching reading, writing, and calculation, by a self-directed activity related to play. Such educational systems as the Dalton plan are an attempt to carry on the same principles of education when the child learns from books. Neither system is, however, pure play, since in both the child's activity is partly energised by a more or less remote end instead of the present attractiveness of the activity itself. This is the distinguishing mark of *work*.

Activities which fulfil Groos's definition of play do not, however, exhaust the list of rehearsal phenomena to be found in animal and human life. Courtship, for example, is an activity which is to some extent a rehearsal of the sexual act, and is indulged in for

its own sake. It does not, however, belong to quite the same class as the fighting or hunting play of young animals, for it is an adult activity, leading up to and having an obvious function in the performance of the sexual act itself. Other rehearsal phenomena discussed by Groos are the baby's exploratory movements of the hands, and his other activities which bring him new experimental sensations. We ought, probably, also to bring under the heading of rehearsal phenomena some of the infantile forms of emotional reaction which are regarded by the psychoanalysts as infantile elements from which the adult sex instincts develop. The attachment of love to the mother, which is called by Freud the *Oedipus complex*, probably serves a function in mental development similar to that of the playful activities. The *Oedipus complex* is, perhaps, the infantile sentiment which is preparatory to the biologically more important sex love of the adult.

Of a rival theory of play still mentioned in the textbooks little need be said. This is the *recapitulation theory* that the child in his play is impelled to recapitulate the behaviour of primitive man just as Haeckel described the foetus as recapitulating its evolutionary history in the course of its growth. Thus Stanley Hall says "I regard play as the motor habits and spirit of the past of the race, persisting in the present, as rudimentary organs"¹¹¹. There seems no reason for supposing that there is any truth in this theory.

There is, however, an important contribution to the theory of play, which has been made in recent years, which suggests that Groos's theory does not cover all the facts. The psychoanalysis of children has successfully used a method, the *play technique*,¹⁴⁹ which is based on the assumption that the mental conflicts of children are revealed by their play, that their play is a dramatic representation of phantasies which are important in their emotional lives.¹⁷² Thus play with human figures may not always be simply maternal rehearsal behaviour, as play with dolls very generally is, but may be dramatisation of the child's phantasies of the relationship between its parents.

I do not think that anyone has claimed that this is true of all play, and it may well be true of a greater part of the play of the neurotic children who are brought to psychoanalysts than of normal children. Phantasy, however, plays a part in the life of all children, and it is likely that a certain part of all the play of children is exteriorised phantasy of the kind studied by the psychoanalysts. If, moreover, the psychoanalysts are right in believing that all children suffer from more or less severe mental tensions which are more disturbing to them than they would be to adults because of the child's lesser power of tolerating mental pain, it may well be

that such play serves an important part in maintaining mental health in the normal child. It is significant that Melanie Klein notices inability to play as one of the marks of the neurotic child¹⁴⁹

One should not omit to notice that play is not confined to the young. Even fully grown animals play, particularly the carnivores whose time is not necessarily fully occupied in getting food. Adult dogs very commonly play, and, amongst birds, ravens are conspicuously playful in their flight, showing prolonged and complicated aerial activity which seems to have no other end than the activity itself. For playful activity amongst adult human beings, one should look rather to spontaneous activities than to organised games. A man who makes a rockery in his garden or who drives his car to the water-side and there lights a fire may be more truly playing in the psychological sense than when he is golfing or at a bridge party, since the latter activities may lack the essential character of being pursued for the sake of the activity itself. Adult play is probably more nearly related to the phantasy play of children than to their rehearsal play, and may serve a useful function in the release of mental tension.

6. Work

Man's activities are not limited to those which are an end in themselves or which lead immediately to a satisfying result. He can also perform tasks which may themselves be monotonous or disagreeable, for the sake of more or less distant ends. Such activity may be called *work*. The incentives to work may be of many different kinds: avoidance of punishment which results from the cessation of work (as given to the horse by the whip), the attractiveness of the end result of a complex activity (as in learning a foreign language), or an end achieved indirectly by the activity (as the money reward of daily work), etc. Some of these, as the threat of the whip, are present incentives, acting at the same time or immediately following the activity they promote; others, such as wages or salary, are remote ones.

The ability to perform uninteresting activities under the pressure of other than immediate incentives is almost peculiar to man. Horses, oxen, dogs, and elephants, can be taught to work, but the incentive is the immediate one of punishment. The actual use of punishment may be rare because the work activity is at first only an extension of a natural activity of the animal and becomes later a habit system. Even this amount of capacity for drudgery must be rare in the animal kingdom, for there are few other animals which man has succeeded in exploiting in this way. Kohler found that a chimpanzee was very reluctant to gather up scattered banana

skins excepting during the first few days on which he was required to do this.¹⁵³ Yerkes reports Boutan as finding extreme fatigue in a gibbon after directed activity in test situations.¹⁵⁰

In contrast with this we find civilised man everywhere capable of prolonged drudgery for remote ends. Much of the pattern of our civilisation is dependent on the capacity of many of its members to perform tasks which in themselves are unattractive, in order to draw wages at the end of the week. Races whose temperamental constitution is such that they cannot adapt themselves to this requirement, are unable to adopt our pattern of culture.

There is plainly no sharp line between work and play. Activities originally engaged in for their own sake may later become organised into habit systems which are pursued only for the sake of the ends attained. Work so based is less far removed from play activity than is work whose elements are in themselves disagreeable from the beginning. Most of the training of a horse is simply a redirection and modification for his owner's ends of activities which the horse would himself indulge in spontaneously. A savage, in hunting, may undergo prolonged discomfort in order to achieve the end of killing his game, but it might not be possible to train him to a wage-earning occupation in a factory or office in which the activity itself is further removed from spontaneous human activities.

7. Incentives to Work

In considering the relative effectiveness of different incentives to work, it must not be forgotten that incentives need not be continuously operative in work of a kind that has been carried on for a long time. A working horse may very rarely need either the application or even the threat of the whip. He has formed a habit system of drawing his burden, which, on the whole, works automatically in response to signals from his driver without the application of any external incentive. So also the human being engaged in uninteresting work is carrying out a system of habits, interference with which would itself be unsatisfactory to the worker, even if the remote incentive of wages were absent.

For this reason, in an industrially trained community the individual's dissatisfaction with unemployment is not removed by the payment to him of money during enforced idleness. Even apart from the fact that the smaller unemployment benefit is a less strong incentive to idleness than are wages to work, idleness is itself a less attractive situation to the man accustomed to work, so work would be preferred if the external incentives were equal. Bakke, investigating unemployment in London, found this strong preference for

work over unemployment¹⁴ A typical statement of it is quoted from a brewery hand "Your money at the Labour-helps out a bit, but it don't give you no work to do, and that's what I miss" This preference is indicated by the small number of recipients of benefit whose claims were disallowed for not genuinely seeking work (only 1·3 per cent of men, 2·7 per cent of both sexes).^{*} Since it appears likely that, in the future, increased efficiency of industrial methods will make necessary only relatively short hours of work for everyone, the educational problem of training for leisure is little less important than that of training for work

While a normal man prefers activity to continued idleness, his efficiency in doing the task at which he is employed depends partly on the incentives which are moving him to activity There has been a good deal of experimental investigation of the effectiveness of various incentives Probably also his happiness and contentment in his work depend on the nature of the incentives to work, although these results of varying incentives are more difficult to measure

The primary incentive to industrial activity is, of course, its money reward At relatively low amounts the incentive value may be simply that of the necessities of life which can be purchased with it, but, as is mentioned elsewhere, the insatiableness of the craving for money makes it of continued value as an incentive even when all primitive demands have been satisfied A more remote incentive is not so effective as a less remote one, so a weekly wage is a more effective incentive than a salary Even a weekly wage is a somewhat remote incentive, so industrial efficiency may be increased by the additions of other incentives Thus a task in which the worker sees an actually completed result, as in the assembling of a piece of machinery, has greater incentive value than one in which a single operation is continuously repeated, as the repetition of the screwing on of a nut on one part of a machine which is being assembled by a line of workers A monotonous task may, however, be given incentive value if the number of times the operation is carried out can be varied by the worker's effort and his success in doing it a large number of times is known If it is known only to himself, the incentive is self-competition, if it can be compared with the score of others, the incentive is competition with these others, if a bonus is paid on accomplishment above a certain level, the wages incentive is added to these Mace has shown that the improvement in work which results from knowledge of the degree of success and its comparison with a standard may be measured under experimental conditions and compared with the effects of other incentives¹⁵¹

^{*} (*Unemployment Insurance Committee, 1927 Minutes of Evidence*)

In drawing practical conclusions from experimental work on incentives to work it must not be forgotten that a system of incentives which makes for maximum output is not necessarily the best for the worker. It is true that the absence of immediate incentives may make work tedious and uninteresting, so their introduction may make the conditions of work more satisfactory. On the other hand, a system of incentives designed to increase production may be a serious burden to those working under it through the strain that it induces. Nor must it be forgotten that increasing strength of incentives may increase intensity of effort without increasing its efficiency. A bricklayer might lay more bricks if he knew that failure to lay a certain number would result in a loss of wages, it does not follow that he would lay still more if he knew that the penalty for failure was that he would be shot. For every condition of work there is probably an optimal range of incentive strength, above or below which there will be less efficiency of work. It is probable that for timid children the threat of physical punishment is an incentive which exceeds this optimal strength and which therefore does not for them increase efficiency of school work.

8. Education for Work

Since, in any industrial community, social well-being depends on this capacity of its members for work, the problem of education for work is one of great practical importance. In the activity of children there is no sharp line between play and work. In the earliest play of children the bodily movements and their immediate results are ends in themselves. Later (from about age 1, 6 according to Charlotte Buhler's observations) an end result such as the structure made with bricks is the incentive which directs the separate movements which lead to it.³⁷ These movements are no longer themselves ends but are means towards another end. This kind of activity is the beginning of work. Later, separate activities themselves tedious or unpleasant, may be willingly carried out for a desired end.

The behaviour of the child carrying out the separate actions of building for the sake of the completed structure is of the same general kind as that of the older boy or girl learning a vocabulary in order to attain mastery of the language or to pass an examination in it. In this case, however, the end is much more remote. It is through activities of which the separate parts are motivated by the end to be accomplished that the child learns finally to work for more remote ends and to overcome greater repugnance for the part activities themselves, and so learns to work. Modern systems of

education try to utilise this willingness of a child to work for the end result of a system of activity. The tasks through which the ability to work is learned may have as their incentives less and less immediate ends as the child grows older. This seems to modern educators to be a better way of teaching the child to work and to tolerate drudgery than that in which such an external incentive is used as the fear of punishment or blame.

9. Fatigue

The continuous performance of work or of any other activity is interfered with by a tendency for its efficiency to be reduced by the after-effects, physiological and psychological, of previous activity, particularly of the same or a similar kind. To this tendency we give the name *fatigue*. A curve showing the onset of fatigue can be obtained by means of an instrument called the *ergograph**. The subject is required to deflect his middle finger, which is so connected with the instrument that each deflection raises a weight for a short distance. After the operation has been performed several times, the deflections of the finger grow smaller and finally cease. Rest is now necessary before the finger can recover its ability to raise the weight. If, however, the weight is lightened, a new series of deflections can be obtained.

The condition of fatigue has also a mental concomitant—the feeling of tiredness—a complex of bodily sensations generally unpleasurable. This feeling usually accompanies the conditions of reduced efficiency of working which we have called fatigue. Hence the word “fatigue” is commonly used in popular speech indifferently either for the conscious fact (knowable only to his own introspection) that a man feels tired, and for the fact (knowable to other persons through study of his behaviour) that continued activity has caused reduced efficiency in that activity. Either or both of these facts is ordinarily indicated by saying that the man is fatigued. Such ambiguities must be avoided in accurate psychological description, and since we have used the word *fatigue* for the behaviour phenomenon, it will be better to avoid that word for the accompanying conscious phenomenon and to speak instead of the *feeling of tiredness*.

The most obvious explanation of the phenomenon of fatigue is the physiological one. When work is done by a muscle the energy for this work is supplied by processes of metabolism which take place in the muscle. These processes consist in the breaking down of more complex chemical substances and the formation of lactic

* Any curve showing the decrease in quantity or quality of the work done on successive performances of an action is called the *curve of fatigue*.

acid The products of metabolism accumulate in the muscle which is thus rendered incapable of further work In the ergographic experiment, however, the muscle refuses to contract any more before the accumulation of the products of metabolism has reached such a point that the muscle is really incapable of doing any more work The end-plate of the muscle (the structure through which the nerve fibres are attached to the muscle) and the nerve fibres themselves refuse to transmit motor impulses to the muscle before the muscle itself is exhausted *

There is also what we call *mental fatigue* It is certain that we all feel tired after a hard day's mental work, and that both the quality and quantity of mental output is then reduced How far this reduction is caused, however, by a factor similar to physical fatigue and how far it is due to a central inhibition related to the condition of boredom, it is impossible to determine Arai performed the incredible task of multiplying pairs of four-figure numbers in her head for twelve hours a day for four days, and found that her time for working out each sum at the end of each day's task was only twice as long as at the beginning This shows that an extremely severe mental task may be followed by surprisingly little fatigue effect

We may regard fatigue as primarily not a direct result of the exhaustion of the muscles employed but as a mechanism of inhibition which protects them from exhaustion † It may be noticed that all the symptoms of muscular and of mental fatigue have as their tendency the prevention of the performance of further activity In muscular fatigue there is slowness of movement and loss of co-ordination, in mental fatigue there is a loss of control over the thought processes and a tendency for the mind to wander The symptoms of muscular fatigue are produced when the products of metabolism have accumulated in the muscles because such accumulation marks a stage in bodily activity when much more activity would be injurious to the tissues employed The point at which fatigue comes on, however, is also determined by other factors, as, for example, the strength of the incentive to work It is also effected by the use of certain drugs such as cocaine and benzedrene, which delay both the onset of the feeling of

* The end-plate thus acts in the same way as the fuse in an electric light circuit This is made of an easily fusible metal which will melt and therefore interrupt the current long before the current is strong enough to injure the other parts of the circuit

† Some of the external symptoms of fatigue are, of course, direct results of the physiological effects of work Such, for example, are the increased rate of breathing, muscular stiffness, etc

tiredness and also the falling off of efficiency. Since, however, these are safety mechanisms preventing true physiological exhaustion, the use of drugs for this purpose is accompanied by the danger that real injury to the organism may result from continued activity if this goes on far beyond the point which would normally have been checked by the onset of fatigue.

The effect of incentive on rate of onset of fatigue is illustrated by the common observation that we quickly become fatigued when we take monotonous and uninteresting exercise. For example, when we walk through dull streets all the symptoms of fatigue may develop when the amount of metabolites produced must still be very small, while ten times as much exercise might have been taken through enjoyable country with less apparent effect of reduced efficiency. The influence of other factors is even more apparent in mental work. The feeling of tiredness, headache, and mind-wandering, may be found to develop in a short time of working at an easy but thoroughly uninteresting mental task such as marking elementary examination papers. This cannot be a direct result of exhaustion of some group of neurones in the brain, for a more difficult but more interesting task may be carried on for a much longer time without these symptoms developing. Indeed, Arai's work leads us to suspect that no ordinary mental task ever brings us near to the true exhaustion of the part of the brain used. Biologically, no doubt, the function of mental fatigue is to protect our brains from such activity as would injure them, either by too long sustained mental work or by not going to sleep at night. This protective mechanism appears, however, to be a very sensitive one, and it may be set into operation by a merely monotonous task. In abnormal conditions the fatigue mechanisms may operate with no adequate bodily cause. This is, for example, one of the symptoms of *neuraesthesia*.

The onset of fatigue, or of the partial muscular exhaustion of which fatigue is a symptom, limits the amount of muscular work which a man can do in one day. This explains the fact that reduction of working hours does not always reduce output, but may actually increase it if the earlier working hours have been excessive so that workers have been in a condition of chronic fatigue. Other practical effects of fatigue study have been to show the value of rest pauses in certain occupations and to make possible the elimination of wasteful and inefficient methods of work, such as those in which unnecessarily large weights are lifted, in which work is unnecessarily monotonous or carried out under bad conditions, and in which the optimal period for working is exceeded by "overtime"

10. Rest and Sleep

The tendency of fatigue is to cause cessation of activity. During such cessation, the organism recovers from the physiological effects of activity and becomes ready for renewed activity. Such a state of rest is most effective if it is accompanied by a state of more or less muscular relaxation. Muscular relaxation can generally be accomplished voluntarily if the body is so supported that none of the muscles are needed to keep it in position. The capacity for voluntary muscular relaxation is, however, defective in some individuals, and these may profit by training in progressive relaxation.¹³¹

The most important method of rest is, however, the state of generalised inhibition known as *sleep*. This is generally in ourselves a state whose appearance is conditioned to certain times at night, when the body is so supported that muscular relaxation is possible. Neither a limitation to certain times during the twenty-four hours of the day nor the possibility of muscular relaxation are necessary conditions of sleep in the animal world. Cats and dogs, for example, will generally sleep at any time if they have nothing else to do, and horses normally stand when sleeping without support. Many races of men, both primitive races and some highly civilised people such as the Chinese, have generally the capacity to sleep at any hour of the day if they close their eyes and relax their muscles. This is a valuable capacity found occasionally in exceptional individuals amongst ourselves. A certain degree of freedom from external stimulation is found commonly to be a favourable condition for sleep, but it is not a necessary one. It is not, apparently, the reception of stimuli from the outside world that interferes with sleep but the impulse to take action with respect to them. The effort to shut out external noises from consciousness is itself an activity and thus a disturber of sleep. If one passively listens to them they may help the attainment of sleep instead of preventing it.

Other potential sleep disturbers are those residual impulses to activity which survive from the activities of the day. When sleep is attained, both external stimuli and internal impulses to activity may find expression in dreams, which, according to the theories of Freud, have as their essential function the preservation of sleep.⁹³ *i.e.* the stimuli and impulses have a tendency to call us to activity, but instead of responding by bodily responses which would bring sleep to an end, we construct a dream in which these invitations to activity are dealt with on the plane of phantasy without interference with sleep. Thus a dryness of the throat may be dealt with by dreaming that we are drinking cool draughts of beer, while the

body remains in sleep, or a knock on the door may be dealt with by dreaming that we are listening to the notes of a drum about which nothing need be done, and unsatisfied love impulses may be dealt with by dreaming that we are in the arms of our beloved. It appears from enquiries that many people do not dream. If the dream is a preserver of sleep, one would expect that such people would be more easily aroused by external stimuli, and this may well be the case although there is as yet no proof of this.

Inability to sleep is one of the common causes of lowered mental efficiency, and it is a sound aim of applied psychology to achieve mastery of the art of sleeping efficiently. An obvious rule for avoiding causes of sleeplessness is to avoid late at night those activities which are likely to lead to residual tensions, such as the engaging in intellectual tasks which will be unfinished, or in difficult discussions at or after the normal time for going to bed. There are drugs which induce sleep, and although there are obvious objections to the use of these, their use may be a lesser evil than insomnia. It may, however, be avoided altogether if one achieves voluntary control of sleep. The most hopeful way of doing this is to bring muscular relaxation under willed control. This is not easy for those whose personalities are of the tense kind, who are the most inclined to insomnia. It needs as constant and persistent practice as the acquirement of a bodily skill. Methods of achieving this end have been described by Jacobsen¹⁸¹ and should be practised by those who wish to learn to sleep without the use of drugs.

CHAPTER XII

THE PERCEPTION OF THE EXTERNAL WORLD

1. The Organism and its Environment

The simplest living creature is an organism surrounded by other objects. Its continued existence as a separate living entity depends on the continued suitability of its reactions towards other objects. These may be divided roughly into two classes: those that are harmful and those that are beneficial to it. Towards these two classes of objects it adopts reactions of opposite kinds, which we may call *avoiding* and *seeking* reactions*. Thus the primitive organism avoids other organisms seeking to prey on it by contraction or withdrawal of its whole body (an *avoiding* reaction). It secures its own food by bringing its body towards the desired object (a *seeking* reaction).

The continued existence of the organism clearly depends on its success in adopting the appropriate reactions towards different objects. An organism which had a tendency to adopt an avoiding reaction towards its own food supply or a seeking reaction towards other organisms which required it as food would soon be eliminated altogether. Thus the tendency to adopt the appropriate reaction in different situations is implanted by natural selection, and we find even such simple organisms as the amoeba seeking and ingesting smaller amoebas or escaping from larger ones without any previous learning.

These are the essential facts of the conditions under which animal behaviour and thought have grown up. There is a free-moving organism of delicate and complicated structure, and an outside world, partly dangerous and partly helpful to the organism, about which his sense organs must give him so much information as will enable him to make suitable reactions towards different parts of this outside world. By the interaction of the environment and the physiological structure of the organism is produced a series of movements of incomparably greater complexity than those of inorganic matter, which we call the organism's *behaviour*.

The environment of the human being is, of course, almost infinitely more complex than that of an amoeba, and his reactions towards it are also more complex. His behaviour is more difficult to study because he has also a mental life; he reacts to the situations in which he finds himself by thought as well as by overt action.

* Or *negative* and *positive* reactions

But he too has been surrounded by an environment partly favourable to him and partly hostile. Every individual's survival has depended on the effectiveness of his reactions towards that environment. The growth of his mental powers has resulted from the necessity of this attunement between himself and his environment.

We cannot, of course, say at what point in evolution mental life begins. We cannot sensibly discuss whether the amoeba has any consciousness. We have, however, in our own consciousness what appear to be the mental correlates of the primitive withdrawing and seeking reactions. These are the conditions known as "pleasure" and "unpleasure". Pleasure is the feeling accompanying the experience of a beneficial environmental condition and is accompanied by behaviour of the seeking kind, while unpleasure is felt in a hurtful environment and is accompanied by behaviour of the withdrawing kind.

As we go up the animal scale, behaviour becomes more complex as the environment becomes more complicated. It still goes on, however, in a manner not altogether different from that of the primitive scheme sketched above. There is still response to stimuli from the outside world, and sometimes from inside the organism, which demand action. There are *affective* reactions to stimuli which modify the responses of the organism to the stimuli. And there are the actions, whether volitional or impulsive, which are carried out by the organism in response to these stimuli.

One of the complications in more developed animal life is that the organism can not only react to actually present objects but can also react to the thought of objects not actually present. The mental representations of these objects are what we call *images*, and in the existence of *images*, *words*, and *imageless thoughts*, we reach entirely new levels of reaction. From the biological point of view, these new developments may also be considered to have been evolved because they had survival value. The capacity for verbal thinking which we value as a means to the forming of correct opinions was evolved not because it served purely intellectual ends but because it enabled our ancestors to deal more effectively with their material environment.

2. Sensation

The simplest instance of an organism being affected by something in the outside world is that of an event in the outside world starting a process in one of the minute *end-organs* in the skin or other sense organ which transmits an impulse along a nerve fibre. The external event producing this effect is called a *stimulus*, the mental accompaniment of such an event is called a *sensation*. The

end-organs which serve the purpose of being acted on by external stimuli are found in the skin, muscles, and joints, and also in certain *sense organs* each adapted to the reception of one class of stimulation. The eyes, nose, ears, etc., are examples of such sense organs. The nerve fibres conveying impulses from the outside world are known as *exteroceptive neurons*. It seems likely that the one original organ of sense was the skin, and that the special sense organs originated as parts of the skin differentiated to respond to particular stimuli.

Some sensations are still given by the skin. These are heat, cold,* pain, and touch. It has been discovered that these sensations are not given over the whole area of the skin. Heat and cold are sensations given only at certain numerous points of the skin known as heat- and cold-spots. Touch is given by points at the root of all the hairs on the skin and at other points often thickly crowded together in such hairless areas of the skin as the tips of the fingers. Pain sensation is given from very much more numerous spots known as the pain-spots. These pain-spots seem to correspond to free nerve-endings in the skin. Heat, cold, and touch have special small end-organs in the skin in which their own nerve fibres end.

These are all the true skin sensations. There remain two kinds of exteroceptive sensation which do not belong to the skin at all, although they are liable to be confused with skin sensations. These are pressure and deep pain. Pressure is the sensation obtained from exteroceptive nerve fibres in the muscles when the skin is pressed down on them. Deep pain is the sensation of pain obtained when this pressure is sufficiently increased. It can easily be shown that these sensations do not belong to the skin itself, for they can be obtained from an area of the body of which the skin has been rendered anaesthetic.

There remain the sensations which have special organs of their own. These organs are the eyes, nostrils, the tongue, the ears, and the vestibular apparatus (the semicircular canals etc., which are part of the structure of the ear). The normal eye is affected by the electromagnetic vibrations we call light and gives sensations of white, black, and the various colours which were attributed by Helmholtz to three primary sensory processes (red, green, and blue or violet)¹¹⁸ and by Hering to four (red, green, blue, and yellow)¹¹⁹.

* It must be remembered that heat and cold are in no sense opposite sensations. As sensations, they are as different as heat and touch. It happens only that the physical stimuli producing them are opposite in character. They are, themselves, different sensations with different end-organs, found generally at different points on the skin.

While there is no known crucial experiment which can decide between these two theories, it seems now that the older three-colour theory is more likely to be right than the ingenious substitute suggested by Hering

The tongue is affected by chemical substances in solution and gives taste sensations of four clearly distinguishable kinds, sweet, salt, sour, and bitter, with two or three others, such as the alkaline and metallic tastes, whose claim to be considered as primary is doubtful. A part of the internal membrane of the nostrils is affected by gases diffused in the air and gives rise to a variety of sensations of smell which, unlike the tastes, do not admit of simple classification

The ear is a sense organ which is affected by vibrations in the air, and these produce sensations of sound. When the vibrations are regular, *i.e.* of simple harmonic form, the sounds produced are pure musical notes of pitch dependent on the frequency of the vibrations, when the vibrations are irregular the sensation is that of noise

In our normal use of the senses, each sense organ is responding to only one kind of stimulus—the eye to light-waves, and the ear to sound-waves. These are the *adequate* stimuli for the sense organ in question. But experiment shows that it is possible to produce a sensation in an end-organ by the use of another stimulus than the adequate one. The retina can, for example, be stimulated by pressure, and an isolated cold-spot can even be stimulated by a hot object. In this case the sensation which appears is the one belonging to the end-organ, not the one belonging to the stimulus. Thus, pressure on the eye produces a sensation of light, and a hot object touching an isolated cold spot gives a sensation of cold. In other words, a sensation gives direct information about the end-organ stimulated, not about the nature of the stimulus

There are other nerve fibres in the body which give us information about the internal condition of our bodies. These are the *interoceptive* nerve fibres. These are in action, for example, when we feel hunger or indigestion. They are of particular importance in the psychology of the emotions and the feelings of pleasure and pain, for it is probable that some part of all such experiences is a sensation of internal bodily changes—that, for example, feeling afraid is, like feeling hungry, an experience largely composed of sensations of changes in one's internal organs communicated by the interoceptive nerve fibres. There is a third class of sensory nerve fibres called the *proprioceptive*. These give information about the positions of the limbs and about movements of muscles and joints

The process which takes place in a nerve fibre as a result of stimulation of an end-organ is a wave of activity, partly chemical in nature and partly electrical, which travels along the neuron at a speed of about 100 metres per second. When the thermionic valve was discovered it became possible to study in more detail than was previously possible the nature of these impulses. Adrian found that the impulses were all of the same size and shape whatever might be the nature of the exciting stimulus. The only differences to be found between different systems of impulses was that the impulses succeeded each other more frequently.

If we think of the nervous system as a telephone system, and of the end-organs as individual subscribers, we must therefore not imagine the subscribers as able to convey different messages along the wires. Rather it is as if all subscribers could say nothing but "Hi, hi, hi" down their instruments, with the one possible variation that they could say it rapidly if the message was an important one and less rapidly if it were unimportant. From such astonishingly simple raw material the mind builds up its complex perceptions of the outside world.

3. Perception

The extreme simplicity of the impulses sent by nerve fibres in response to external stimulation should warn us against the acceptance of an old-fashioned theory of perception which experiment shows to be very much too simple to fit the facts. This is the theory that each end-organ when stimulated gives rise to its own sensation, and that these sensations combined are the perception. This has been called by Kohler the "constancy hypothesis"¹⁵⁴. It seems particularly plausible as an explanation of visual perception. We know that the corneal surface and the lens form a refracting system which produces a photographic image on the retina. The retina is composed of a multitude of end-organs, the rods and cones, each of these is stimulated by the light of that part of the retinal picture which falls on it, and might be supposed to transmit through one of the fibres of the optic nerve an impulse to a corresponding point of the brain surface, where it gives rise to its appropriate sensation. Then the visual perceiving of the outside world would be simply the becoming aware of a picture already formed by a mosaic of sensations.

That visual perception takes place in some such way as this was generally taken for granted by psychologists of the past. The most systematic exposition of this view has been given by the great physiologist and psychologist Helmholtz¹¹⁸. It has always been clear that it was not a complete account of visual perception since

this is not merely the forming of a visual picture but the appreciation of the significance of its parts. If, in the seeing of a house, all that is given by sensation is a rectangular red patch, it is certain that we are also aware that it is a house, that it is made of brick, that there are rooms inside it, etc. All of these additional parts of the complete perception were called its "meaning" and were supposed to be added by the activity of such processes as memory and judgment to the system of sensations which formed the core of the perception. It was not doubted, however, that all that was immediately experienced in perception was this system of sensations each determined wholly by the nature of the stimulation of some end-organ.

There are, however, many objections to this account of visual perception. In the first place, if the retinal image were transmitted as a picture to the brain, the number of nerve fibres required for the transmission would be equal to the number of sensory elements on the retinal surface. In fact, their numbers are not equal, the number of end-organs in the retina is about two hundred times the number of fibres in the optic nerve.

Another difficulty is made by the fact that there are many characters of visual perception which have no corresponding sensation, such as, for example, motion and depth. This was first pointed out by Wertheimer in connection with the perception of motion.¹⁰¹ The case of depth is, however, equally clear and somewhat easier to experiment on. The old theory of perception treated extension as directly perceived but regarded depth as inferred from such immediately experienced facts as the double images which result from the disparity of the retinal images of objects at different distances.* But this alleged difference between the perception of extension and of depth corresponds to no difference in our experience: we seem to perceive depth and extension equally immediately. Moreover, we may not experience the alleged facts of sensation from which depth is said to be inferred. If a solid geometrical figure is drawn from two different points of view and the resulting two pictures are presented separately to the two eyes, as in a stereoscope, it is easy to verify that when solidity is most perfectly seen, the doubleness of images disappears. Michotte has performed experiments to show that even causal relations between objects, *e.g.* one thing pushing or pulling another, are immediately perceived and are not merely products of a process of judgment.¹⁰²

* Thus Berkeley said: "Distance, of itself and immediately, cannot be seen. For distance being a line directed endwise to the eye, it projects only one point in the fund of the eye, which point remains invariably the same, whether the distance be longer or shorter."²

Even if we confine ourselves to the very simple case of the perception of colours, the matter is by no means so simple as the constancy hypothesis would lead us to suppose. It is commonly said that light of a certain wavelength, or combination of wavelengths, will give us the sensation of yellow, another of blue, and so on. But there are, in truth, differences in the appearances of colours which have nothing to do with the wavelength. The yellow colour of a lemon looks different from any yellow colour we can get from the spectroscope. In the one case the yellow is seen on a surface, in the other as a spongy film of indefinite location and thickness. Both look different from the yellow of a glass of lemonade. Yet all three may be stimulating the retina in exactly the same way, as is shown by the fact that they may all look identical when observed with one eye through a blackened tube. When looking at them in the normal way with both eyes, their colour characters must be supposed to be due not simply to the nature of the stimulation on the corresponding part of the retina but also to their spatial relations to other objects.

Katz would call the colour of the lemon a *surface colour*, that seen in the spectroscope a *film colour*, and that of the lemonade a *volume colour*.¹⁴⁶ The differences between them may be called differences in the *modes of appearance** of the colours. These are real differences in the visual appearances of objects when there are no differences in the physical nature of the local stimulation and therefore, on the constancy hypothesis, no difference between the sensations.

There are certain facts connected with the appearance of brightness, size, and shape, which bring out this point even more clearly. If a black paper is strongly illuminated and compared with a white paper in shadow, it is seen as much darker than the white paper even when both reflect the same amount of light to the eye. On the constancy hypothesis, we must say, as Helmholtz did, that they are then giving us equal sensations but that by a process of judgment we decide that the white paper is really, *i.e.* physically, the brighter. This, however, does not explain the actual facts. The psychologist who knows the nature of the effect and who can measure the light reflected from the two papers and knows it to be equal must *judge* that their luminosities under those conditions of illumination are equal. Nevertheless, he *sees* them as unequally bright and no effort of his thought processes can enable him to overcome this impression. As phenomena they are unequally bright.

* This is the usual English translation of Katz's *Erscheinungsweisen der Farben*. It could be expressed more idiomatically as "how colour looks".

Similar facts are found in the perception of size and of shape. If two objects of equal size are seen at different distances, the farther one looks the smaller, but very much less smaller than is its retinal image. If its actual size is increased until the two retinal images are equal in size, the farther object looks much the larger. There is an intermediate position, differing for different people, at which the apparent sizes of the two objects are the same. At this point of apparent equality, the physically larger object is at such a distance that its retinal image is smaller than that of the other object.*

So also a circular object seen at an angle may make in the eye a very much flattened elliptical image, but the seen shape of the object may be little different from a circle. We can arrange an ellipse with its long axis in a line from the observer at such an angle that the apparent shape to him is circular. The shape of the retinal image will then be found to be that of a horizontally elongated ellipse. This shape is not, however, itself seen, what is seen is the circular shape which is between this stimulus shape and the physical shape of the object.²⁷⁸

These facts were known to some, at least, of the psychologists who held the older view that perceptions were made up of sensations. They were regarded as *illusions*—*i.e.* as unusual facts of perception in which the activity of the mind itself distorted the experience and misled us as to the nature of the stimulation of the sense organ. Thus the tendency to constancy of brightness was explained by Helmholtz in the following way. When the brightly illuminated black paper looks darker than the shadowed white, it is nevertheless giving a brighter sensation than the white paper. By the operation of our judgment based on previous experience of papers in different illuminations, the white paper seems to us to be the brighter.

If we bear in mind the full range of facts which it is necessary that this explanation should cover, it will be seen to be unsatisfactory. In all everyday vision, *i.e.* in all vision except under such unusual conditions as monocular vision through tubes and other artificial laboratory devices, constancy effects are occurring all the time. If we lift our eyes now and look at objects around us, there

* These have been called *constancy* effects, since their general tendency may be regarded as that of making appearances (or "phenomena") relatively constant when stimulus conditions change.¹⁴⁶ Another way of looking at the matter is to say that phenomenal characters are not entirely indicated by stimuli but are a compromise between the characters indicated by the stimulation of the sense organ and those of the real (in the sense of physical) object. This interpretation is implied by the term *phenomenal regression to the real characters of objects*.²⁷⁸

will be no colour, no shape, and no size, of objects which is determined only by the conditions of local retinal stimulation. How, then, can we properly speak of sole determination by local stimulus conditions as normal and of perception influenced by an active response of the mind as exceptional? The mind must be active throughout perception, and there is no reason for distinguishing illusions as a special class of experiences in which the activity of the mind interferes with the exact correspondence between appearance and peripheral stimulation.

Nor does there seem sufficient ground for asserting the existence of this "sensation", which exactly corresponds with the peripheral stimulus but which is elaborated by previous experience and judgment. In the above experiment with black and white paper, we can find out by physical measurement that the brightly illuminated black paper is making an equally bright retinal image. This is a physiological fact but it does not follow that there is a corresponding psychological fact. The elementary sensation as a constituent of a complex perception is not a fact of experience; it is a logical construct necessitated by accepting the constancy hypothesis as a basic postulate for the explanation of perception. A basic postulate is not, however, a self-evident truth but a principle of explanation to be adopted if it gives adequate guidance as to observed fact, and to be replaced if more adequate guidance is given by an alternative system of postulates. Such an alternative system will be discussed later, in the section on the Gestalt theory.

It has been argued above that the fact that different conditions of local stimulation may produce similar perceptual effects makes it difficult to regard perception as a combination of sensations each produced by its own local stimulation. The same conclusion follows from consideration of the opposite case in which different perceptual effects are produced by the same conditions of local stimulation. This case may be illustrated by the reversible and ambiguous figures which have been studied by Rubin.²⁷ If, for example, the four diagonals are drawn in a regular octagon and the eight resulting sectors are made alternately black and white, a figure is obtained which may be seen either as a white cross on a black background or as a black cross on a white background [Fig 6 (a)]. Or a pattern may be made which appears as either a series of black T's on a white background or as a series of white fleurs-de-lys on a black background [Fig 6 (b)]. These are truly different perceptions although they arise from identical stimulus conditions. On the sensation-plus-meaning hypothesis, they would

be explained as identical systems of sensation with different interpretations or meanings. Experimentally, however, there is no evidence that there is anything identical in the experiences from reversible figures, a subject who has on a first exposure seen the black T figures will not recognise the pattern as the same if, on a second exposure, he sees the white fleur-de-lys figures.

These diagrams show in a simple form one of the characteristics of all perceptions, the organisation of the perceptual field into *figure* and a background, or *ground*, on which that figure appears.

Another objection to the theory that perception is the blending together of sensations each resulting from its own local stimulus is that there may be a positive element in a perception at a point in the field where there has been no stimulus and therefore, on this theory, no sensation. We know, for example, that where the optic nerve enters the eye there are no visual end-organs, this is the

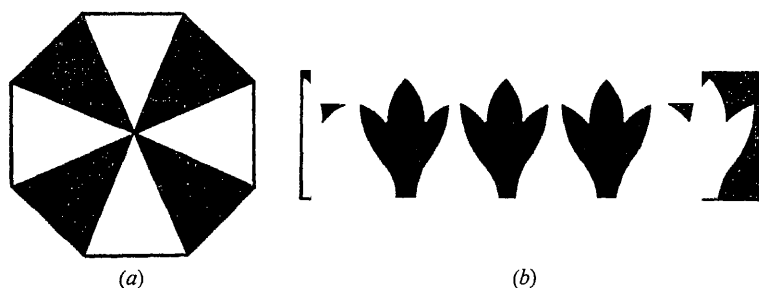


Fig 6

blind spot. Yet when we close one eye there is no corresponding gap in the visual field. If we move the eye so that the image of a small object on the wall falls on the blind spot, we can no longer see it, but there is no gap in the visual field, the wallpaper is seen as if it were continuous over the spot which was occupied by the missing object. If a line or other simple figure runs over the blind spot it is seen as complete even where its retinal image is falling on the insensitive part. Even more strikingly, Fuchs has shown that if injury or disease of the optic nerve renders one half of the retinal surface insensitive, a simple geometrical figure whose image is thrown partly on the sensitive and partly on the insensitive side of the retina may be seen as complete.¹⁰¹

If a perception were built up out of sensations each of which was the direct result of the transmission of an impulse along a nerve fibre from an end-organ, we should expect a blank in the perceptual picture corresponding to places where no impulse has

been transmitted. An analogy to this theory of the cause of perception might be found in a physically possible (although not actually used) method of transmitting photographs telegraphically by forming an image on a plate composed of a large number of photoelectric cells each of which was connected by a wire to a corresponding reproducing cell at the other end. If some of the connecting wires were cut or if some of the elements in the transmitting screen were absent or out of action, we should obviously have a corresponding blank in the transmitted picture.

If, however, perception is an activity of the mind itself of which sensory stimulation is generally a determining cause but not a necessary condition, absence of sensory stimulation over part of the area would simply mean that the mind would be free to complete that part in accordance with the laws of its own internal activity. The charts published with weather forecasts showing the lines of equal pressure are constructed from information received from various land stations and ships. The absence of information from any area does not necessitate a blank in the corresponding part of the chart. It means simply that that part of the system of isobars is filled in by guesswork and is less likely to correspond to the actual pressures in the area represented.*

There are, then, a number of facts which are difficult to explain on the hypothesis that perceptions are built up out of sensations. These facts are, however, easily understood if we abandon that theory and suppose that a perception is not something produced by a stimulus but by the activity of the organism itself. The role of the stimulus may be supposed to be to control the perceptual activity of the organism in such a way as to bring it into practically useful relationship with the outside world.

The construction of a weather chart is probably a much closer, though by no means perfect, analogy to the process of perception than is that of telegraphic transmission of a photograph by a number of wires. A more commonly used analogy is that which compares the role of the sensory stimulation to that of the words spoken in a play which give an actor his cue that it is time for him to appear on the stage. The luminosity of the retinal image of the brightly lighted black paper in the brightness-constancy experiment is a *sensory cue* for the resulting perception of brightness. If it were the only cue, the resulting perception would be of

* L. F. Richardson has pointed out to me that the isobars over the sea in weather charts, being based on less information, are generally simpler in form than those over land areas. This is analogous to the observation of Fuchs that the figure completions on insensitive retinal areas tend to be of simple shapes, a circle is completed more easily than a square, and so on.

an object of the same brightness as the shadowed white paper * There are, however, other cues, such as the position of the light and the outline of the shadow, which also have their effect on the apparent brightness of the papers and make the shadowed white paper appear the brighter Similarly, the apparent size and shape of seen objects are not the result only of the size and shape of the retinal stimulation but also of other cues such as those which determine the perception of distance

If this way of regarding perception is accepted, we have no longer any use for the concept of sensation as an elementary ingredient of perception We may, of course, find it convenient to use the word "sensation" (as it was used in an earlier section) for the perceptual experience which results from the simplified stimulus situation in which we are considering only the effect of a single stimulus on a restricted group of end-organs of one kind Experiments of this kind do not, however, reveal the ultimate mental elements out of which our experience of the outside world is built, they are merely means of finding out how many different kinds of end-organ there are The information they give us belongs, therefore, rather to sensory physiology than to psychology

These considerations apply to other forms of perception than vision We find, for example, that by stimulating the end-organs of the tongue in various ways four and only four experiences can be obtained sweet, salt, sour, and bitter Under the influence of the sensation psychology, investigators said, therefore, that there were only four taste sensations and that the complexity of flavours which men think that they obtain is simply an illusion due to their confusing taste and smell sensations Psychologists are now willing to admit that the complexity of flavours is a true fact of perception and that the experiments on the sensory sensitivity of the tongue simply show the physiological fact that this complexity is the product of the response of only a small number of different kinds of end-organ in the tongue and that the responses to the flavours of food are not determined by cues from these end-organs alone but also from cues obtained from the smell sense-organs ²³⁸

4. The Gestalt Theory

Criticism of the sensation theory and the provision of an alternative hypothesis to account for perception was carried out in the first place by a group of psychologists—Wertheimer, Kohler,

* A condition which can be realised by adopting any method of looking at the papers which eliminates these other cues as, for example, by looking at them with one eye through a blackened tube or through two holes cut in a piece of cardboard Both papers then look grey, the brightness of the grey being wholly determined by the amount of light reflected from the papers

and Koffka—whose distinctive hypothesis was called the *Gestalt theory*^{1,4} Many of the early contentions of the Gestalt psychologists have been very generally accepted by experimental psychologists, and are no longer distinctive of any particular school. Some of their views are speculations whose final confirmation or refutation by experimental research has not yet taken place. If we are to appreciate the importance of the Gestalt psychology in the development of modern experimental psychology, it is necessary to bear in mind that this is not merely a body of speculation but that it is also a great system of fruitful experiments about perception which would constitute a real contribution to psychological knowledge even if all the hypotheses which originally inspired them were shown to be false.^{1,2}

Wertheimer had originally maintained that a perception was an immediate response to complex stimulation and was not a compound of the simple sensations which would be the responses to the elementary parts into which the complex stimulation could be divided.^{3,1} For those who accepted this contention, interest was shifted from the study of sensations to that of the principles of organisation of the whole perceptual field. Such problems as those of movement, shape, and of meaningful wholes became central for experimental research.

The perceptual field was seen to be organised in such a way that certain unitary parts stood out as wholes more or less *segregated* from the rest of the perceptual field. These segregated wholes were called *Gestalten*, or *configurations*. Thus if three equidistant dots are placed on a sheet of paper they form a segregated whole of triangular shape. If a large number of similar dots are added, this unification of the three dots may be lost and they may simply be elements in an irregular pattern of dots. In various ways they may be given back their Gestalt character—if they are joined by three straight lines, if they are painted a different colour from the other dots, or if they move in relation to the other dots while retaining their own relative positions.

Segregation of such a unitary whole in the perceptual field is not something that must exist either completely or not at all. It exists in various degrees. Wertheimer proposed certain laws specifying the conditions under which parts of the perceptual field would tend to form strongly unified and segregated configurations—similarity of parts, nearness of parts, the stability of simple configurations such as the circle, etc.

The distinguishing feature of a Gestalt is that it is a whole whose properties are not those of the sum of its parts but which has new properties of its own. Kohler has maintained that

physical systems in dynamic or static equilibrium are Gestalten in this sense¹⁵¹ Thus the Gestalt properties of perception are not peculiar to psychology but are characteristic of any system in which stresses between its parts determine the characters of the whole system, as, for example, in the distribution of electrical charges over a system of condensers

If this view of Kohler be accepted, it follows that the characters of the organisation of the perceptual field can be expressed in terms of forces between its parts It can be regarded as a system in dynamic equilibrium, in which the properties of the parts are determined partly by the forces created by the local stimulation, partly by forces existing between any part of the field and the remainder of the perceptual field, and partly by forces contributed by the perceiving organism Forces of the first two kinds may be called *external forces*, those of the last kind may be called *internal forces* An example of an internal force is to be found in the tendency to perceive the most stable and simple geometrical shapes in preference to complex and irregular ones if the external conditions of perception are such that both are possible

Koffka explains "constancy of shape" by supposing that when an ellipse is rotated about its short axis so that it gives a retinal image of a flattened ellipse but is nevertheless seen as a circular shape, this is because it has been rotated into a direction of phenomenal space in which there are stresses acting in the direction of the short axis of the retinal ellipse which tend to change the phenomenal shape from the retinal shape into one nearer to the real shape¹⁵² Perception in the absence of adequate sensory cues is simply perception determined primarily by internal forces An interesting outcome of this line of thought has been Metzger's demonstration that perception determined by internal forces tends to be three-dimensional,¹⁵³ and that what is necessary to explain in the perception of the external world is not (as in traditional discussions) how certain stimulus conditions produce the perception of depth but how the perception of one-dimensional surfaces is produced

In the past, those who have asserted parallelism of brain processes and psychological processes have been inclined to assume that the brain processes are relatively simple and that the fundamental processes of the mind must have an equal simplicity Wertheimer has suggested on the contrary that mental processes are just as complex as they seem to be and the corresponding brain processes must be equally complex This is the Gestalt hypothesis of *isomorphism* If Gestalt properties are found in physical systems, as Kohler contends, it is plainly possible that all the

organisational characters of perception (and of all other mental processes) exist as similar organisational properties of the brain processes by which they are accompanied. The brain process in perceiving is thus considered to be a condition of dynamic equilibrium, whose organised properties are represented in the perception.

In the words of Tolman, both mental processes and the corresponding physiological processes must be considered as *molar* and not as *molecular* phenomena.²⁸⁷ The "reflex" of the reflexologists and the "idea" of the associationists are like the "sensation" in being concepts serving molecular principles of explanation. They are all used to explain complex wholes as made up of simple parts. If, on the other hand, we treat perceptual configurations as wholes with properties of their own which are not explicable in terms of their parts, we are following the Gestalt psychology in giving a molar explanation of perception.

The general principle that a whole may not be best explained by treating it as a sum of its parts has wider explanation in psychology than its application to the problem of perception. In explaining human behaviour, in studying personality, or in studying the psychology of groups, we have the choice between the molecular and molar principles of explanation. The now widely accepted preference for treating complex wholes as wholes and not as aggregations of simpler elements is now generally called *field psychology*. The original Gestalt psychology was the application of field principles to the problem of perception.

5. Phenomena and Physical Reality

In discussing constancy effects we found it necessary to distinguish between the *physical* properties of objects (*i.e.* those found by physical measurement), their *stimulus* properties (those characteristic of the way they affect the sense organs), and their *phenomenal* properties (those they have in appearance). Thus a distant large object is physically larger than a near small one, but at a suitable distance it may be found that they are of the same apparent size, *i.e.* they are phenomenally equal, when the physically larger object is so much further away than the other that its stimulus size is smaller than that of the other. Our perceptions belong to the order of phenomena, but their biological purpose is to enable us to adapt our behaviour to the requirements imposed by the physical world outside us. There must therefore be a sufficient structural equivalence between our perceptions and the outside world to enable this adaptation of behaviour to be made. Such experiments as the above show, however, that this structural correspondence is not necessarily exact.

The outside world consists of objects, events, and of relations between these. There is a system of relationships between outside objects which we call physical space, and a system of relationships between events which we call physical time. Although they serve the purpose of enabling us to orient ourselves with respect to physical spatial and temporal relations, the properties of phenomenal space and time are not identical with those of physical space and time. The phenomenal present, for example, as was pointed out by William James,¹³³ is not instantaneous but has a certain duration. Phenomenal space is not uniform in all directions but is, in Koffka's phrase, *anisotropic*.¹³²

If we try to justify our belief in a physical world of objects and events ordered in space and time, we have to fall back on such arguments as the apparent equivalence of the system for all observers. Psychologically however, our intuition of the system of objects and events as real, in the sense of not imaginary, is not an inference but a primary element in our experience. Michotte has shown by ingenious experiments in which a picture of a simple object is rapidly replaced in the field of vision by one in the same place but differing from the other in colour, size, or shape, that one may have, under different conditions, the perception either of a single object changing in some property or of its replacement by another object with different properties. In other words, the phenomenon of a single enduring physical reality may be experienced when we know that the physical fact is the replacement of one object by another. This demonstrates that the character of phenomenal reality in the seen object is not necessarily a function of our belief that the seen object is a single physical object. In our ordinary life we both believe that the objects around us are part of physical reality and also have the experience of phenomenal reality in connection with them. This experience may be called our *sense of reality*. It is an experience which accompanies our realisation of the behaviour imperatives imposed on us by the outside world. In certain pathological conditions (as in some forms of *schizophrenia*) this sense of reality is lost and there is resulting maladaptation to environmental demands.

CHAPTER XIII

THE THOUGHT PROCESSES

1. Behaviour and Thought

Behaviour is not necessarily an immediate response to external stimulation. Human responses, and probably those of the other higher mammals, may be variously modified and even initiated by the internal events which we call processes of thought. Let us suppose that a man is given the task of opening a box with a locking device such as those on animal puzzle-boxes. He will not begin by making random movements of different parts of the box and only open it correctly after unsuccessful movements have been progressively eliminated in successive trials. In an extreme case, he will make no movements at all except the correct ones. He may begin by sitting still and looking at the box for two or three minutes and then proceed at once to make correctly the necessary movements to open it. From the point of view of an outside observer, these minutes of stillness appear to be a period of complete inactivity. But if we question the subject of the experiment we find that this period has appeared to him to be one of great activity, although this activity has been of thought and not of explicit action.

Behaviour of an animal in which he accomplishes his object by trying out several lines of activity and so discovering which lead to the required end, is called *trial and error behaviour*. When a man achieves an end by a method in which explicit behaviour is replaced by thought processes, the method may be called that of *trial and error in thought*. He may have thought to himself in words "If I lift the latch before withdrawing the bolt, it will be in the way of the bolt, but if I pull out the bolt first I can lift the latch afterwards" and so on. Or he may have mentally pictured himself carrying out these actions and foreseen their results. He may, in other words, have carried out his trial and error either in words or in concrete imagery.

A similar period of apparent inactivity followed by sudden solution of a problem was observed by Kohler in his chimpanzees.¹⁵³ The chimpanzee, faced by a task he could not at once perform, such as that of moving a box into a position from which he could reach bananas suspended from the roof, did not carry out random behaviour until he obtained a solution. He would sometimes, after

his first unsuccessful efforts, sit down, look puzzled, and scratch his head. Then his face would suddenly relax and he would get up and at once drag the box into the right position. He too seemed to have, in some manner, thought the problem out and to have understood its solution.

Even, however, in such a simple case of problem-solving by thought as that of a man puzzling out in his mind how to open a puzzle box, it is somewhat inadequate to describe it as a case of solving the problem merely by trial and error in thought. Certainly he is not to be supposed to be making merely random trials in thought of which the successful ones are selected. His solving of a complex puzzle will depend on his thought trials being not random but directed by an increased insight into or comprehension of the problem as a whole. Part of what is happening when he makes his trials is that his perception of the problem is being so reorganised that he sees into its nature as a whole. This progressive attainment of insight is the most important part of the contribution made by his thought processes to the solution of a problem.

The playing of chess might be taken as an example of trial and error by thought, since explicit trial and error is prohibited by the rules of the game. It is true that in thinking out a move, thought trials are made. The player may think "If I move my queen there, my opponent will advance his pawn, and this will follow." If this is, however, merely random trying out of the immediate consequences of moves, the player will not be very successful. The value of such trials to the experienced player is that they contribute to his insight into the situation in the game as a whole. When he has this insight, the next move may be obvious, until he has it, mere trial and error will only help him to estimate the immediate consequences of his moves, which will not carry him very far.

It is obvious that one of the outstanding features of human behaviour is the extent to which it can be modified by processes of thought. It is by thought that a man is able to react to objects and situations remote from him in space and time. By thinking in words, he is able to react to concepts which have no correspondence with any actually perceivable thing. His reactions to a given situation may, for example, be determined by his emotional associations to the concept of justice. By his knowledge of logical and mathematical relationships he can form connections between his images which lead to new mental attitudes of belief, disbelief, trust, etc., all of which affect his conduct. The behaviour of a man in danger of death by burning may be largely determined by the confidence he feels in the logical adequacy of the ontological argument for the existence of God.

It is agreed at the present time that we cannot properly treat human action as the product of motives which are entirely determined by calculation. Such writers as Bentham exaggerated the influence of thought processes on conduct and neglected the irrational impulses which also play a part in determining human behaviour.²⁴ More modern writers have sometimes exaggerated the importance of these irrational factors. It remains true that for successful prediction of a man's behaviour it is not enough to know what are his habits and his unconscious motivational system, we must also know what he thinks.

On the other hand, it is true that the thought processes themselves may be to some extent the servants of the affective processes behind conduct. Trotter has used the word *rationalisation* for the tendency to produce in consciousness a reasonable motive based on logical thought processes to account for action which has really been produced by some unrecognised affective bias.²⁸⁸ But even here thought processes have an effect on conduct, though it is not of the kind supposed by the man himself. A specious reasoned justification of dishonest conduct undoubtedly proceeds from the dishonest person's affective necessity for reconciling his conduct with his Ego-ideal, but the rationalisation is by no means without influence on his conduct. It enables him to go on being dishonest by getting rid of a conflict which, unless dealt with in that or some other way, would necessitate either the abandonment of his dishonesty or of his Ego-ideal. This is an indirect but none the less real modification of behaviour by thought processes.

2. Associationism

Historically, one of the most important attempts to found a psychology which would explain the whole of thought and conduct by the operation of a small number of simple mental laws was the principle of associationism, which attained its climax at the beginning of the nineteenth century in the work of James Mill.¹⁹³ It is necessary that we should distinguish between the *Laws of Association*—a set of principles which have been known since the time of Plato, and *Associationism*—the general method of a psychology which made these laws the fundamental principle for the understanding of mental operations.

The laws of association which have been generally admitted are first, the *law of association by contiguity* in time or place, that an idea *B* tends to follow an idea *A*, if *A* and *B* have been previously experienced together in time (either simultaneously or successively) or at the same place, and, secondly, the *law of*

association by similarity, that an idea *A* tends to call up an idea *B* if *B* resembles *A* *

One of James Mill's examples of association by simultaneous contiguity in time was that, having previously seen a violin and heard the tones of the violin synchronically, it now happens that when we think of the tones of the violin its visible appearance occurs to us at the same time. Successive contiguity he illustrated by the process of learning by heart. In learning a passage, we repeat the words successively from the beginning to the end. In repetition the words also come in succession, the preceding always suggesting the succeeding and no other.

The most important example we can find of association by similarity is the mental operation of classifying, *i.e.* of showing identical verbal or other reactions to similar things, which is essential to conceptual thinking. Thus, when we have heard the word "monkey" applied to a particular four-handed, hairy animal, the sight of another similar animal calls up the idea of "monkey" by association through similarity.

The laws so far described can be used only to explain the processes of thought. The associationists believed that, with the addition of certain laws of the determination of the strength of different bonds of association by frequency of repetition, by recency, etc., a complete account of the psychology of thought could be given. A further principle was necessary in order to explain behaviour. This was provided by the conception that pleasure and pain were the two determinants of behaviour and that we learned to follow lines of behaviour to which the idea of pleasure had become associated and to avoid others which had become associated with the idea of pain. This theory is commonly called the theory of *psychological hedonism*,† and the combination of these two theories may be called the *associationist-hedonist* theory.

An example of the use of this combined theory in the explanation of human behaviour is to be found in James Mill's account of the origin of parental love.

* There was dispute about the exact number of associative laws. Some writers included a principle of *association by opposition* as when the idea of black calls up the idea of white. Hume added *association by cause and effect*.¹²⁸ James Mill rejected the law of association by resemblance and admitted only the law of contiguity. Associations attributed to opposition and to cause and effect are probably only special cases of the effect of contiguity. Resemblance, on the other hand, seems to be a true cause of associations. It is difficult to see how similar but not identical things could be classified together without the operation of some such principle.

† To distinguish it from the theory of *ethical hedonism* that the increasing of pleasure and decreasing of pain *ought* to determine our conduct.

"First of all, there can be no doubt, that all that power of exciting trains of ideas of our own pains and pleasures, which belongs to the pains and pleasures of any of our fellow-creatures, is possessed by the pains and pleasures of a man's child

"In the next place, it is well known that the pains and pleasures of another person affect us, that is, associate with themselves the ideas of our own pains and pleasures, with more or less intensity, according to the attention which we bestow upon his pains or pleasures. A parent is commonly either led or impelled to bestow an unusual degree of attention upon the pains and pleasures of his child, and hence a habit is contracted of sympathizing with him, as it is commonly, and not insignificantly named, in other words, a facility of associating the ideas of his own pains and pleasures, with those of the child" ¹⁹³

Similarly, a child's avoidance of a hot poker may be attributed to the pain following an earlier act of touching it having caused the idea of touching it to be associated with the idea of pain

It is obvious that the ideas of pleasure and of pain may be superfluous in these explanations. A child might avoid a hot poker after once burning himself because a reflex avoidance was called up directly without the intervention of any thought about pain. Introspection seems to show that while thoughts of pain and pleasure may occur in reflective thinking about objects we have learned to avoid or to seek, they are not essential to these reactions. We avoid what has proved harmful to us and seek what has proved beneficial, without any thought of pain or pleasure. We might then modify the associationist-hedonist account of the matter by substituting "avoiding and seeking reactions" for "ideas of pain and pleasure". We should then have a picture of the motivation of conduct which would be essentially that of the reflexologists or the extreme behaviourists. It might still not be a true one. It remains possible that the impulsion to certain lines of conduct is not acquired but inborn, or, if it is acquired, that it is acquired in some other way.

The approach of associationism to the problems of the mind was "atomistic", it sought to understand the processes of thought by analysing them into simple elements. In this respect it reflected the scientific attitude of its time. James Mill was a contemporary of Dalton and published his *Analysis of the Mind* twenty years after Dalton had brought forward his atomic theory of matter. Dalton's theory made a notable advance in the understanding of chemistry, and it was natural to hope that a similar advance might be made in other sciences by the same method of approach. J. S. Mill called the associationist-hedonist system of theories "mental chemistry"

It is obvious, however, that a principle which has been a successful guide in one branch of knowledge may not be equally successful in another. We have already considered some of the reasons for rejecting an atomic account of the structure of mental processes. Neither introspection nor experiment seems to give any support to the view that thought processes are made up of discrete elements, the ideas, bound together by bonds of association. It is true that, under certain conditions, discrete elements of thought such as images or words may be observed, but the principle of association of ideas claimed to explain the whole of thought, not only a part of it.

The associationist psychology differed from the chemistry of its time in one vital particular. The theories of associationism were not based on experiment. Whereas experiment amply justified the atomism of Dalton, it was found when psychologists began to experiment that the expectations of the associationist-hedonist atomism were not fulfilled. So experimental psychologists were led either to complicate the simple associationist theory by adding subsidiary hypotheses which destroyed its one advantage of simplicity, or else to reject the view that thought processes could be understood by postulating simple elements as their constituents.

A central weakness of associationism was the fact that its principles could only explain the reproductive or mechanical side of thought. Controlled thinking is directed and dominated by the necessity for solving the problems which originated it. We solve our problems, not by forming successions of ideas each of which is determined by the strength of its associative bonds with the last, but by counteracting any tendency of our minds to such mechanical association by selecting our ideas in accordance with their relevance to the purpose in hand. In Spearman's terms, such thought is *eductive*, whereas the associative tendency is merely a *reproductive* one.²⁵⁶ The emergence of reproductive processes when eductive processes are required is a common source of error.

Even in the explanation of purely reproductive processes, the simple associative principle is not adequate. There is an obvious difficulty in explaining the learning of poetry by heart as the result of associations formed between each word and the next. Let us suppose that the passage is "The curfew tolls the knell of parting day." The associationist principle explains that we say "curfew" as the second word because, in learning, it became associated through successive contiguity in time with "The." But the next time "the" comes, it calls up not "curfew" but "knell." With which of these words did "the" become associated in learning? The difficulty is insoluble if we think of serial learning as the

forming of associative bonds between successive words. We must regard as the determining cause of the saying of "knell" not the preceding word "the" but the whole of the preceding passage. This was stated by Bradley as the *Law of Redintegration*. "Any part of a single state of mind tends, if reproduced, to reinstate the remainder." But here we are giving an explanation in terms of a whole state of mind, not of the elements into which it can be analysed. If this principle be admitted, as it certainly must be, the distinctive character of associationism is destroyed, for even mechanical learning cannot be explained by associations formed between successive ideas.

Associationism has been the starting-point of many fruitful experimental enquiries. In that way it has been serviceable to psychology. In itself it was sterile, and the long preoccupation of psychological thought with this "mental chemistry" probably did a great deal to retard the development of a true science of mind. If the test of a scientific psychology is its power to enable us to understand and predict human thought and behaviour, the associationist-hedonist theory failed lamentably and its speculations are now only of historical interest.

3. Imagery

The associationists were content to describe the elements of the processes of thought as "ideas" without concerning themselves with the question of whether this word stood for a single kind of process or for many different kinds. A new impulse to a more realistic study of thought came from Galton's investigation of imagery, which was primarily an attempt to answer this question.¹⁰² Whereas perception is the process of becoming acquainted with our surroundings by means of information supplied by the sense organs, *imagery* is a process which, in its experienced qualities, somewhat resembles perception but is not based on present excitation of the sense organs and is not taken to indicate a present external reality*. Thus we may describe ourselves as seeing "with our mind's eye" a scene not now actually present before us or as hearing "with our mind's ear" music or voices which were actually perceived at some time in the past, or we can sit in a chair and have the imagined experience of making the movements of swimming. These are examples respectively of *visual*, *auditory*, and *kinaesthetic*, or *motor*, *imagery*.

* This imagery must be clearly distinguished from such sensory after-effects as the patch of green seen after the retina has been stimulated by a red object. These are unfortunately called "after-images", but are of an altogether different nature from memory images or the images of dreaming. The ambiguity is avoided in German by the use of the term *nach-bild* for our "after-image".

Different individuals differ very much in the extent to which they experience different kinds of imagery. One of Galton's important findings in this field was his demonstration of the existence of these individual differences in imagery. By sending out a questionnaire to a large number of people asking them to image their own breakfast tables and to answer questions about the colour, the brightness, and the clearness of the objects they could see on them, he found that some denied that they had any such capacity at all, and these believed that no other person had. Others understood his question quite clearly and were able to perform the necessary operation and to answer his questions about it. Similar individual differences were found to exist in the power of mentally representing sounds and movements.

Galton divided his subjects into types possessing predominant *visual*, *auditory*, and *motor* (or *kinaesthetic*) imagery. These he called *visiles*, *audiles*, and *motiles*, respectively. Later investigation has shown that matters were not quite as simple as Galton supposed. For example, this division into different imaginal types seems to imply that the capacity for imagery of different kinds is negatively correlated, *i.e.* that the individual with good visual imagery will tend to have correspondingly poor auditory and kinaesthetic imagery, and so on. This appears not to be the case. Carey has shown that, on the contrary, there is a positive correlation between the different forms of imagery, that the individual with good visual imagery is likely also to be superior in the other kinds of imagery, although not necessarily to the same extent.⁴⁹

There is, however, no doubt that there are great individual differences in the range, vividness, and clearness, of imagery possessed by different persons, so that some persons have, for example, no capacity for visual representation at all, while others have visual images of vividness comparable with that of actual perceptions.

It is more doubtful whether these differences in the imagery of different individuals correspond to any important differences in their intellectual performances, whether, for example, the individual with good visual imagery is better able to remember what he has seen than one who remembers past visual experiences by calling up words which are descriptive of them. That the visualiser should be superior in this respect is a reasonable expectation, but it has not been confirmed by experimental enquiry.

An example of failure of a mental ability to show its expected dependence on the use of imagery is the following experiment which was carried out by Betts.²⁸ He asked his subjects to suppose that a wooden cube painted red on the outside was cut into twenty-seven cubes, and to say how many of these smaller cubes would have

paint on three faces, how many would have paint on two faces, and how many would have no paint on them at all. Afterwards he questioned them in order to find out what imagery they had used in solving the problem. This is the kind of task which one might expect to find could be solved only by the use of visual imagery. This experimenter found, however, that thirty-five per cent of his subjects reached the solution without the use of imagery, and that these made as good records in accuracy and speed as did those who reported the presence of imagery.

Differences in literary styles have also been attributed to differences in imagery. The use of visual material in poetry, as in that of Shelley, or the use of visual metaphor in philosophical abstract writings, have been taken as evidence that their authors were of the visile type. Concreteness and a distrust for merely abstract thinking have been supposed to be characteristic of the person whose thought processes largely consist of visual images.

The principal extension of knowledge about imagery since the time of Galton has been Jaensch's distinction of a type of visual imagery which he calls *eidetic imagery*¹³². This is found amongst a certain proportion of children, generally, although not always, disappearing in later life. It differs from the typical visual image in its greater stability, in its occupying a position in the space in which external objects are seen, and in the possibility that the subject may report from the image a detail which was not noted in the original perception of which it is a revival*.

When we read Galton's account of visual imagery in the light of Jaensch's work, we find that he was sometimes describing eidetic imagery without realising that this was different in kind from the visual imagery of other subjects. He speaks, for example, of people mentally reading from their manuscripts when making speeches, and mentions a statesman who attributed certain hesitations in speech to the effect of corrections in his original manuscript, a point strongly suggestive of eidetic imagery. In conversation, I have heard Blackburne describe his method of playing simultaneous blindfold chess in a way which can leave no doubt that he employed eidetic imagery. He said that he had a mental picture of the board on which he was playing, that he made a move on it as he would on an actual board, and that he found the pieces on it in the position in which he had left them, when he returned to the image of that board after having played on the others. He mentioned that if he started a game with one of his boards in the wrong

* In all of these respects it resembles the *primary memory image* found commonly, but not in all people, for a second or two after the cessation of a perception.

position, with a white square at the left-hand corner, it remained so throughout the game. He could not alter the image while the play was in progress. On the other hand, Zukertort, who had equal powers of blindfold simultaneous play, did not, I believe, use a visual method.

It is probably safe to assume that abnormal powers of visual remembering are always the result of the employment of eidetic imagery. With this exception, there is no evidence that the power of imaging visually confers any special superior ability in remembering or any other intellectual task to its possessor. If such abilities exist, they have not yet been discovered. It seems most likely that the visual image, although a striking feature of the phenomenology of the thought processes, is functionally unimportant—that the effectiveness of the traces employed in visual remembering is not influenced by whether or not their activity is accompanied by the appearance of a visual image.

The study of imagery has not, therefore, led to any important results in psychological practice, and there has in consequence been a considerable decline in interest in imagery even as a theoretical problem. Some psychologists have denied that imagery has any existence even as a phenomenon of thought.²⁹⁸ This odd opinion may find its explanation in Galton's finding that those people who have no visual imagery themselves are inclined to believe that others remember past experiences by the same means as themselves, and that their description of a process of mental picturing is simply a confusion in language.

We may reasonably ask how far the behaviour of animals is influenced by images or other processes of thought. It would indeed be senseless to enquire how any animal's mental processes appear to the animal itself, but it is a sensible question for investigation whether the animal's behaviour is such as to indicate not only immediate reactions to external stimuli but also determination of behaviour by objects which are no longer present but past objects of perception. Experiments have been done on this subject by the method known as that of *delayed reaction*, in which food is placed in one of a number of receptacles while the animal is looking on, but he is not released until some measured time after the concealment. Kohler found that chimpanzees went straight to the place where food had been buried even after a delay of seventeen hours.¹⁵³

The capacity for such behaviour varies enormously in different animals, being much greater in those with highly developed nervous systems. Animals below the monkeys find great difficulty in performing delayed reaction tasks. The behaviour of the domestic hen towards concealed food, for example, is in striking contrast

with that of the monkey²⁻⁷ If a monkey sees a titbit put into a piece of paper or box, he will continue to make efforts to get at it If his attention be diverted to something else before he has achieved his object, he may return later to his task with unabated ardour The hen, on the other hand, when she sees grains of corn covered by a piece of paper, makes only a few random scratches on the top of the paper, and soon ceases She does not make the very simple movements of beak or feet necessary to push the paper off the grains, and only in fact picks them up if they are accidentally uncovered

The stimulus necessary to determine the reaction of a hen is *an optical impression actually present*, for a monkey it may be an optical impression once present but now past We may be tempted to say that the monkey is moved by a visual image of the food he has seen concealed, but about this we cannot be certain We know that human behaviour can be influenced by some kind of mental after-effect of past experiences which need not appear in consciousness as a mental image Let us call this after-effect a *trace* We must say, then, that the monkey has a trace which leads him so patiently to unwrap the food In attributing this behaviour to a trace, however, we have asserted nothing about the contents of the monkey's consciousness, only about his behaviour Whether the activation of a memory trace gives the monkey the conscious experience of a visual image is a question we are obviously unable to answer since we can have no introspective account from the monkey himself

4. Imageless Thought

An obvious question which arises at this point is whether that part of the content of the mind which is not perception is composed entirely of images of various kinds or whether there are also elements of thought which are not images

It is, of course, no answer to this problem to say that thought without images must be possible since we can also think in words This is true, but a word also may occur in thought as an image Sometimes, although not commonly, words are thought of as visual images of their written appearance, more commonly either as auditory images of their sounds or kinaesthetic images of the movements of the vocal apparatus which would be made in pronouncing them* We must therefore distinguish between *verbal images* and

* It is possible that all so-called kinaesthetic images are really perceptions of small movements made in the muscles, and that the kinaesthetic images of words are the perception of small movements of the vocal muscles made when we are thinking in words This was maintained by Watson²⁹⁸

the *concrete images* which are mental representations of objects of sight, hearing, etc., such as were investigated by Galton

There remains the problem as to whether there are other contents of thought than concrete and verbal images. This is a question which can be decided in one way only, by introspective examination of the thought processes.

The examination and exact description of thought processes is not a matter as easy as it may at first sight appear, and it was not until the beginning of the present century at the Psychological Laboratory at Wurzburg, under the leadership of Kulpe,⁹⁰ that such observations began to be made in a way which made it possible to give a reasonably certain answer to this question. The method used was that the subject was asked to solve a simple problem, to make a judgment, to grasp the meaning of a sentence or to answer a question, and immediately after his answer was given he was required to report all that had passed through his mind during the few seconds between the posing of the problem and the finding of the answer. These operations were repeated again and again with the same subjects, until the task of reporting their mental processes, which was difficult at first, became relatively easy.²⁸⁶

One of the most important results which emerged from these experiments on thought processes was that a description of the sensations and images, verbal and concrete, did not complete the observable contents of the mind. There were other elements in the processes of thought which, since they were thoughts and yet were not images, were called *imageless thoughts*. For example, when a subject is given the task of responding with its opposite when he is shown a word, he is in a condition of mental tension which might be expressed in the words "opposite to be called out when word is exposed". This tension may not appear in consciousness as a form of words or even as an image. It is simply the awareness that a particular problem has been set which the subject understands and could put into words if required. It is a mental fact which must be expressed by a new word. The word used in German is *Aufgabe*, which may be expressed in English as *consciousness of a problem or mental set*.

Another kind of imageless thought was called in German *Bewusstheit*, in English an *awareness*. If we read a word, let us say "horse", it serves the purpose of referring to a certain class of animals about which we have a certain amount of knowledge—of the fact that they draw carts, have manes and tails, and so on. It appears from these experiments that we may think about this class of animals without the occurrence of either the word "horse"

or of a concrete image of a horse as a mental process. Similarly, we may think of a word denoting a relation let us say "higher", without formulating this word mentally or forming a mental image of one object higher than another. Such an imageless thought is what is meant by an *awareness*. It is an imageless mental presentation of an item of knowledge.

The central conclusion that can be drawn from these experiments is that a great part of the process of thinking is not composed of definite images, either concrete or verbal. T. V. Moore performed experiments in which he presented incomplete pictures to his subjects for their recognition. He found that an imageless awareness of what the picture represented preceded the mental act of naming or of imaging the object intended.¹⁹¹ For example, a picture might be presented to the subject which, after a short hesitation, he named as a bird. When asked whether he knew that it was a bird because the word "bird" came to his mind or because he had a mental image of a bird, the reply would be that, on the contrary, he first knew that it was a bird and then the name and possibly the image came into his mind. This suggests strongly that the image and the word are not essential steps in the process leading to the name of the object, since they occur after the nature of the picture is recognised, the recognising seems to be a process of imageless awareness.

If imageless processes may make up the process of thinking, without any necessary accompaniment of concrete and verbal images, the latter do nevertheless occur in thinking and have their own important function. If we make an effort to think clearly, to examine our processes of thought in order to see whether they are adequate to support our conclusions, then we must think in images (preferably verbal images). So it is not surprising that images are liable to occur in the mind when there is some interference with the train of thought, as when there is a difficulty in proceeding to a conclusion or when we deliberately stop the train of thinking to examine some point more carefully. Thus, Aveling says, "Thought is perpetually in process of becoming, in which process it passes beyond itself. It is unstable. The image is a relatively stable formation, and as long as it is present in consciousness its conceptual element will also tend to remain"¹³. This is also the conclusion to which James came in his famous chapter on "The Stream of Consciousness", in which he says "Like a bird's life, it seems to be an alteration of flights and perchings. The resting-places are usually occupied by sensorial imaginations of some sort. . . the places of flight are filled with thoughts of relations"¹³³.

CHAPTER XIV

LANGUAGE AND THOUGHT

1. Language and Conceptual Thinking

Many animals have means of communication by which the end of concerted action may be attained. Communication between ants is stated to take place by the mutual tapping of the antennae.⁹¹ Bees have been shown by von Frisch to communicate to each other the direction and distance of a source of nectar by the form of a dance carried out on the combs in the beehive.¹⁰⁰ Amongst mammals, however, the greater part of intercommunication takes place by the use of auditory signals. These animal cries are not a language, since they are capable only of communicating the simplest things such as danger, challenge, etc. With a more flexible vocal apparatus, man has elaborated his cries into a system so efficient that by their means he can attain such complex social co-ordination as that of a moving army, or can communicate to his fellows a theory of the universe. Also he has in many cultures devised methods by which the visual symbols of writing can be used as equivalents to the auditory symbols of language and serve the same ends of promoting social co-ordination. In some cultures he has also devised gestures which may be used either as accompaniments of or as substitutes for the vocal communication of language.

The symbolisation of meanings by successions of significant sounds is not, of course, the whole of language, although it is all that is dealt with in dictionaries. Changes of intonation, which in some languages, such as Chinese, modify the logical meanings of words, in our own language convey only indications of emotion and of attitude. We do not fully understand the speech of a people unless we can respond to these differences as well as to those which express differences in dictionary meanings.

The acquirement of language begins with the child's play activity of babbling, in which he repeats a much larger number of sounds than those which are given significance in his own language. Under social influence, he employs a limited number of these in words and sentences, which are finally those of the adults around him although in an early stage many may be elements of a private language of his own.

It is sometimes said that the stresses which lead him to the use of language are those of commanding adult behaviour to satisfy

his needs. My own experience with young children convinces me that this is not altogether true, since a large part of their talking in the first months of speech is of the nature of commentary on outside events and not of imperatives. These cases can easily be distinguished by the absence or presence of bodily expressions of tensions and by the fact that unfulfilled imperatives cause repetition and finally the violent reaction to frustration. The prevalence of this "commentary" use of language is probably to be explained partly by the fact that early speech is, in Groos's sense, a play activity, indulged in for its own sake and not for the attainment of external ends,¹⁰ and partly by the fact that such external ends as are aimed at by the child are those of establishing social contacts with other persons as well as the end of satisfying primary needs.

The functions of words are twofold. First, to provide a system of symbols communicable from one person to another. We might do our own thinking fairly satisfactorily in concrete imagery, but if we had not words we could make only very clumsy attempts to communicate ideas to each other. Secondly, to provide a vehicle in which our own thinking can be carried on in a manner more precise and better adapted to the resolving of problems requiring precision of thought than is possible with concrete images. The important contribution to thinking which is made by words is its extension of the possibilities of conceptual thinking—giving not merely the possibility of thinking of classes of concrete objects but of classes of classes to any degree of abstractness.

The first step in conceptual thinking is that of thinking of classes of concrete objects. For this degree of conceptual thinking, words are certainly not essential. The meaning of the whole class of dogs may, of course, be carried by the word "dog", but it may also be carried by a concrete image, either one that is vague and schematic or (in a good visualiser) one that represents the shape, colour, etc., of a particular dog, but which, nevertheless, is serving the function in thought of representing the whole class of dogs.¹¹

Aveling found, in his experiments on conceptual thinking, that his subjects generally only used concrete images in thinking about particular objects.¹² Their use as thought indicators for classes of

* The old philosophical controversy as to whether we can have *generic ideas* or whether we are confined to particular ideas mainly rested on different uses of the word "idea" which probably themselves resulted from differences in the imaginal types to which the controversialists belonged. Those who denied the existence of generic ideas were probably good visualisers whose mental pictures were so accurate that they could only represent at one time the characters of particular objects. Since, however, such images can serve the function of conveying generic meanings, and since these meanings can also be carried in thought by words or by an imageless awareness, the defenders of the possibility of generic ideas would seem to have the best of the argument.

objects has obvious disadvantages, since they tend to frustrate the aim of thinking generally of a class by tying thought to the particular case

As, moreover, we go further from thought about everyday objects, the value of words as vehicles of thought increases. It is difficult to see how a visual image could satisfactorily carry the meaning belonging to the word "instinct". Any use of a visual image for conveying this meaning would be liable to lead to confused and inaccurate thinking, while such a word as "entity" could not be given any concrete visual form.

The compensatory disadvantage of verbal thinking is that it may lead to the use of abstract terms which have no meaning but which are used as counters in a kind of verbal game of abstract thinking which has its own rules but has no reference to anything outside. This danger may be avoided in abstract social intercourse, as in a lecture, by the giving of concrete examples of abstract statements. Thus a psychologist may make the abstract statement "An aggressive reaction may be produced by frustration of any behaviour tendency", and go on to help his hearers to grasp its meaning by saying "For example, a baby may show anger because he is not fed when he is hungry or because his limbs are confined when he wants to move about". This illustration by a particular instance cannot replace the abstract statement, for the abstract statement means more than this. It is simply the citation of one or a few of the class of particular cases which are included in the more general statement. It is not a proof of the more general statement, and it must not be understood as such, that would be the error of proof by anecdotalism. The illustration does, however, perform the very important function of helping towards understanding, not only by the hearers but by the speaker himself. Everyone who makes an abstract statement should be prepared to illustrate it by a particular instance, and when we meet an abstract statement we should not imagine that we understand it until we can illustrate it by a particular instance. Thus both abstract and particular forms of expression are useful to serve the ends of intelligible communication of general or abstract statements, and both concrete and verbal imagery are useful for clear conceptual thought.

The meanings of the words of ordinary speech may be insufficiently precise for the purposes of the type of description and conceptual thought required for scientific purposes. Thus a science has a language of its own which is a system of technical terms carrying abstract meanings different from those of any word in ordinary speech. Examples of such technical terms are *electron*, *field of force*, *conation*, *behaviour tendency*, etc. Much confusion

may result from taking terms from ordinary speech and redefining them with technical meanings. *Intelligence, repression, instinct*, are examples of such terms in psychology. All are used with meanings in psychology different from those of popular speech, and all are liable to produce misunderstanding by those who read them in their technical use and understand them with their popular meanings. They have in popular speech considerable variation of meaning, *i.e.* they have different meanings in different sentences. This variability of meaning is not a defect in popular speech, but it would be intolerable in a scientific vocabulary. When technical terms are devised for the purpose of a scientific vocabulary this source of confusion is avoided.

In general, the things that one can say are determined in large measure by the language in which one can say them. A proposition may seem to be self-evident when we say it in a certain way, yet it may not be true. The appearance of self-evident truth may simply have been the result of the language system we used in saying it. We cannot rely on this appearance of self-evidence to tell us whether such a statement is true or false; this must be found out by observation or experiment. This test by observation and experiment is then a test of the adequacy of the language system we have used. It can also be the case that a proposition which appears to be self-evidently true may turn out to be unverifiable and therefore meaningless. Again the language system which led to the appearance of self-evident truth requires revision. In all cases we must be suspicious of apparently self-evident propositions the truth of which is dependent on a particular way of using language. For example, the possibility of freedom of choice in human action seems to be precluded by the way of talking about action as determined by the strength of competing impulses, for this way of talking implies that always the resultant action must be due to the strongest impulse. This, however, is not to be taken to prove that freedom of choice is impossible. If, on other grounds, we believe in the reality of freedom of choice, then this way of talking about the determination of behaviour must be regarded as inadequate. What happens is to be determined by observation and experiment, not by examination of the implications of language; if our use of language does not lead us to expect that to happen which in fact does happen, then it is our language that must be changed.

It appears from the experiments of Kulpe and his colleagues,⁹⁰ that, in the process of thinking as distinct from communication by speech, a conceptual thought process may be imageless. Even

though, however, definite verbal images may be generally uncommon in the flow of internal thought, it does not follow that words are unimportant in thought. It often happens that in our thinking we want not merely to solve problems but to know whether our solutions are correct. Conclusions may be reached by the process of imageless thinking, but the test of logic can only be applied to a thought process which has been expressed in words. Verbal thinking is therefore used when we wish to be careful of the validity of our thought processes.

Finally, it is possible that thoughts were originally carried by words or images, even though in the process of individual development they have later grown independent of them. An initial dependence of thoughts on words is, for example, suggested by the autobiography of Helen Keller, who, blind and deaf from a very early age, never had the use or understanding of words until they were communicated to her by the patient tapping on the palm of her hand by a teacher of the blind and deaf¹⁴⁷. She describes her feelings when the meaning of a word dawned on her for the first time. She speaks of the word awakening her soul, giving it light, hope, joy, and setting it free. Something very definitely new clearly entered into her mind at this time, her language suggests that words meant for her not merely new vehicles for old thoughts but the possibility of thinking new thoughts altogether. Her initiation into the use of words seems to have meant the beginning of clear conceptual thoughts. The meanings which may afterwards have been independent of words only became possible to her mind when words came to carry them.

It is sometimes said that conceptual thinking is a purely human achievement because it depends on the use of language. The first step in conceptual thinking is the forming of groups of particular objects into classes, and the behaviour aspect of this mental achievement is the capacity to react in a certain way to all members of the same class. This capacity certainly develops at a lower level of mental evolution than that of man. We may consider, for example, the following experiments by Lloyd Morgan on chicks¹⁹⁶.

To some chicks he threw cinnabar larvae, distasteful caterpillars, conspicuous by alternate rings of black and golden yellow. "They were seized at once, but dropped uninjured, the chicks wiped their bills—a sign of distaste—and seldom touched the caterpillars a second time. The cinnabar larvae were then removed, and thrown in again towards the close of day. Some of the chicks tried them once, but they were soon left. The next day the young birds were given brown loopers and green cabbage-moth caterpillars. These were approached with some suspicion, but presently one chick ran

off with a looper, and was followed by others, one of which stole and ate it. In a few minutes all the caterpillars were cleared off. Later in the day they were given some more of these edible caterpillars, which were eaten freely, and then some cinabar larvae. One chick ran, but checked himself, and, without touching the caterpillar, wiped his bill—a memory of the nasty taste being apparently suggested by association at sight of the yellow-and-black caterpillar. Another seized one, and dropped it at once. A third subsequently approached a cinabar as it crawled along, gave the danger note, and ran off. Then I threw in more edible caterpillars, which again were eaten freely. The chicks had thus learnt to discriminate by sight between the nice and the nasty caterpillars.”

The following experiment was made with another group of young chicks. “Strips of orange and black paper were pasted beneath glass slips, and on them meal moistened with quinine was placed. On other plain slips meal moistened with water was provided. The young birds soon learnt to avoid the bitter meal, and then would not touch plain meal if it were offered on the banded slip. And these birds, save in two instances, refused to touch cinabar caterpillars which were new to their experience. I have also found that young birds who had learnt to avoid cinabar caterpillars left wasps untouched. Such observations afford evidence that black and orange banding, irrespective of particular form, may constitute a guiding generic feature in the conscious situation.”

The chicks had thus developed a particular way of reacting towards a class of objects distinguished by alternate black and yellow strips. This black and yellow had been disintegrated from other perceptual elements, for black and orange banding was responded to irrespective of other elements in the perception (for example, form), and all objects with this *black-orange banding* quality were refused. The chicks’ behaviour was, in fact, just that which would have resulted from the formation of a concept of a *black-orange banded* class of objects which were not good to eat.

An investigation directed towards the problem of how far rats were able to form such concept reaction patterns was undertaken by Fields.⁸⁵ He showed clearly that by training rats to react differently to circles and to triangles, it was possible for them to show these different reactions to any member of the class of triangles and circles, even if different in structure from the particular figures with which they had been trained.

It is obvious that we cannot know how the recognition of a new object or figure as belonging to a class demanding a special type

of reaction appears to the consciousness of a chick or of a rat. We can only demonstrate that they show concept reaction patterns. We may express this by saying that they can form a *compound trace* for that class. This capacity to react distinctively to a class probably precedes in mental evolution the capacity to think in concepts.

2. Social Functions of Language

Although the use of words has an important value in the enriching of individual thought by extending the possibilities of conceptual thinking, its primary purpose is that of providing an exact and flexible means of social intercourse which extends the possibilities of effective social co-operation.

We may use the word *meaning* for the technique of use of a word or phrase. The technique of its use may be the referring to some object, event, or relation, in the world outside, or the commanding of some action. Even words, however, of which the primary purpose seems to be reference to objects or events, may have at the same time other techniques of use. They may also, for example, express emotional attitudes towards the object or event referred to. The words *firm* and *obstinate*, *brave* and *foolhardy*, *thrifty* and *mean*, for example, are pairs of words generally used to refer to the same qualities of character, but in each pair the first expresses commendation, the second condemnation, of that trait. Even when using the same word, let us say *clever*, the intonation of it may express attitudes of approval or of severe disapproval. Such pairs of words with the same reference but indicating opposing emotional attitudes may be said to have the same *factual* meanings with different *emotional* meanings.

The use of words with emotional meanings is not an imperfection of ordinary speech. Indeed, the exact appreciation of emotional meanings is a necessary condition for the understanding of the language used by other people, and a common cause of imperfect understanding of a foreign language is often that the emotional implications of the language are less perfectly understood than the dictionary meanings of its words. On the other hand, the emotional meanings of words may interfere with the process of rational thinking, since conclusions may be determined not by the logic of arguments used but by the emotional implications of the words in which they are conveyed. Propagandists whose intention in the use of language is to influence sentiments and attitudes may do so by the device of using words expressive of disapproval for the opinions they wish to attack, while choosing words expressive of approval for the opinions they wish to support.

In exact thinking, our object is the opposite one of using words only in their referential function to stand for things, events, relations or concepts, without indication of emotional attitudes. When we try to use, for the purpose of exact thinking, words which are already used in ordinary speech, this aim is difficult of attainment. Many of the terms of psychology, for example, such as *character*, *will*, *passion*, *instinct*, and *intelligence*, carry implications of approval or disapproval which are irrelevant to the function we require the words to perform in a strictly scientific psychology. The construction of a scientific psychology requires us to use words without emotional meanings, either by redefining such words so that they perform the function of reference without expression of attitude, or, more simply, by using new terms which have no emotional meanings.

Language has other social functions than that of promoting co-operative activity and conveying information. If one supposed that these were the only functions of language, one would be puzzled by hearing one man, meeting another in the street, tell him that it was a fine day. For this use of language in which the social function predominates and the conveyance of meaning is altogether subordinate, Malinowski suggested the term *phatic communion* ²⁰. Perhaps one object of such phatic communion between strangers is the recognition of whether both belong to the same social group. Observation of intonation and pronunciation decide whether one is to treat the stranger as an equal or to remain aloof from him. But probably this is not its only function. The mere establishment of social relationship, which takes place by speech and is impeded by silence, may be the important function of phatic communion.

3. Remembering and Forgetting

Any constituent of thought—a concrete image, verbal image, or an imageless thought—may fulfil the function of standing for past experience. A motor habit also may provide a point of contact with past experience, and the establishing of contact with past experience by the use of motor habits is included in the ordinary meaning of the word “memory”. Thus, when we have formed the laryngeal habit of repeating a series of nonsense syllables, we say that we remember them, using the same word as of our ability to reproduce the gist of a book we have read, although in the latter case there has been no formation of laryngeal habits by repetition, and probably no exact reproduction of the original. These have generally been distinguished as *mechanical* (or *rote*) and *logical* remembering respectively.

It must be borne in mind that an image is not a memory image by virtue of being a copy of past impressions. It may well be

both an inaccurate and an incomplete representation of a past perception. It is a memory image in virtue of the fact that its function in thought is to refer to a past experience. Similarly, an image which refers to a situation or object which is thought of as belonging to the future is an image of the *imagination*, although it may be no less like past perceptions than a true memory image. The difference between these two kinds of imagery is a difference in their function, not a difference in their origin. This is equally true, of course, of any other constituent of thought than the image.

That an activity or perception now past is able to be revived in thought, makes it necessary for us to suppose that the original activity or perception has left some enduring change in the organism which accounts for this potentiality of revival. This enduring change is generally called the "memory trace".

If all that it was necessary to account for in remembering were the revival of particular perceptions or activities, it would be necessary only to suppose that each particular activity or perception of the organism left its own trace and that these traces could be made active in those conditions which led to remembering. It is rarely, however, that remembering involves only a single activity or perception, more commonly it is a group of such experiences to which the present experience is related.

Let us suppose, for example, that we are trying to remember what a hedgehog looks like. We have seen in our lives not one hedgehog but many. The trace which is activated must be compounded of the many perceptions we have had of hedgehogs of different sizes and in different positions. The case is not really different when we are remembering a particular object. I have seen Mr Jones's face from many angles and with many different expressions. Any activity of remembering him will utilise a trace compounded of many different experiences of him, but not containing any of my experiences of Mr Brown or of Mr Robinson.

A very large proportion of the everyday activities which we should classify as remembering involve such compound traces, and a psychology which treated remembering only as a matter of the activation of simple traces left by single experiences would give a very inadequate account of the matter. Such compound traces are called by Koffka *trace-aggregates*¹⁵². F. C. Bartlett gives a very similar account of remembering but rejects the word *trace* because it suggests too much the explanation of memory as an effect of residua of single experiences,* and uses instead Head's term *schema*¹⁸.

* And also because it suggests a passive view of memory in which the mind or brain is thought of as a "storehouse of past impressions".

The forming of a compound trace is a process in which there is interaction between a present perception and a previously existing trace system. We may ask what determines the particular trace or systems of traces with which a particular present perception interacts. Why, for example, does each successive experience of Mr Jones's face contribute to the same compound trace and not to those of the faces of Brown and Robinson? Similarity seems obviously to be one factor. If Jones and Brown resemble each other very much my memories of them may form part of a single compound trace, so that I am inclined to confuse them. Similarly, there is a tendency for many people to form a single compound trace representative of mice and rats, so that a mouse is always recognised as an unexpectedly small member of the mouse-rat class and a rat as an unexpectedly large one.*

The existence of traces is not an immediately observable mental fact, it is a hypothesis to account for several different kinds of observable mental fact.

(1) The activation of a trace either by a present perception or by a train of thought may lead to the appearance in the mind of a concrete image. This may be clear and detailed and representative of a single perception, or vague and schematic and representative of many perceptions whose individual characters have been lost in their combination in a compound trace, or it may be, as we have seen, clear and detailed but nevertheless functionally representative of a compound trace.

(2) A trace may be similarly activated without giving rise to a concrete image. The experience of such activation is an imageless thought.

(3) The activation of a trace by a present perception may give rise to the process of recognition, with the accompanying experience of familiarity.†

Thus the statement that I have a compound trace or schema of Jones means one or more of the following three facts: that I

* In the same way, it has been suggested that the difficulty of learning series of nonsense syllables is the result of the fact that their similarity leads them to tend to form a compound trace representative of all of them whereas the task required is to reproduce them separately.

† This activation of a trace by a present perception is the minimum that any theory of recognition must assume. That it is not a complete theory is shown by the fact, observed by MacCurdy¹⁷⁴, that a psycho-pathological patient, suffering from the Korsakoff syndrome, may correctly point to the one of a list of names which is that of the physician but without any feeling of familiarity. It seems to him to be a mere guess. There is connection between trace and present process but no recognition. Koffka maintains that what is here lost is the connection of the trace system with the Ego.¹⁸²

can call up a visual image of his face, that I can think about him without having a visual image, and that when I see him I recognise him. The experiments described earlier on the functional unimportance of concrete imagery show that those individuals whose traces do not lead to the first of these results are not handicapped in attaining the second and third. The possibility of calling up a concrete image is no doubt indicative of the existence of a trace system, but the absence of this power does not indicate the absence of a trace system.

The communication with our past provided by persistence of motor habits and of memory traces is not permanent. The power of recall passes away in the course of time, and this passing away is known as *forgetting*. There is no evidence for the popular idea that all memories are retained for ever "subconsciously". There is, on the contrary, every reason for supposing that many memories are obliterated completely. The slow fading of memories which takes place through their slight interest and through the lapse of time is known as *oblivescence*. The course of oblivescence was shown by Ebbinghaus, using memorised nonsense-syllables as his material, to be rapid at first and then progressively slower.⁷⁴ A graphical representation of this course is known as the *curve of forgetting*.

The loss of effectiveness of traces through the passage of time is certainly not the sole cause of forgetting, since other investigators have found that there is an element in forgetting which is not directly dependent on lapse of time. It has been found, for example, that after a learning task very much more is lost if the interval is filled with the ordinary tasks of the day than if it is spent in sleep.⁶⁰ Since the time interval is the same, it must be the different ways in which the time has been spent that have determined the greater forgetting in one case. This suggests that a large, perhaps a main, part of the forgetting commonly attributed to oblivescence is really due to a factor described by Ebbinghaus as *retroactive inhibition*—the tendency of later tasks of the same kind to inhibit the effectiveness of previous learning. Retroactive inhibition has itself been explained, by Kohler and Restorff, as a result of trace aggregation, the earlier traces become ineffective to perform their specific tasks of recall because they have become aggregated to later traces.¹⁵² Thus, if we learn a list of words so that we can repeat them correctly, we may fail to repeat them correctly a few hours afterwards not because time has weakened the traces but because they have become organised with other traces formed later, so that their individual character has been lost. If we had slept during the interval, no new traces would have been

formed, so that we might have been still able to repeat the list correctly

In addition to this, there is an active process of expulsion of painful memories from the mind by repression, as maintained by Freud. Some incidents of a painful kind, such as those that are the precipitating cause of a phobia, are completely obliterated from the mind within a short time of their occurrence, but retain their power of influencing conduct. Repression, like the other kinds of forgetting, is not a process under direct voluntary control. There is no evidence that all forgetting is of the nature of repression, although this has sometimes been maintained.

4 Phantasy Thinking

We have already described one kind of thinking, in which concrete images, words, and imageless thoughts, pass through the mind under conscious direction with a consciously chosen purpose. The purpose may be to find out the best way of opening a puzzle-box, to solve a mathematical problem, or to decide in conversation what to say next; all such problems are decided by consciously controlled processes of thought.

Sharply opposed to this is the kind of thinking which takes place in conditions when we have lost interest in the environment and its problems, and indulge in day-dreaming or reverie. In these conditions the conscious control of the processes of thought is relaxed, and the thoughts are left to follow each other as they will. The first form of thinking we may call *controlled thinking*, the second *phantasy thinking*. The characteristic features of phantasy thinking are its relative detachment from the environment and from any tendency to result in action, the absence of voluntary control over the course of thought, and the tendency to a relative predominance of concrete over verbal imagery in the actual content of thought.

Its main function seems to be compensatory. We can live in a smoky industrial town and save ourselves from the depressing effects of our surroundings by indulging in dreams of green fields and open country. We can be employed in a monotonous job with no prospect of advancement and yet be saved from the hopelessness that such a situation might engender, by indulging in dreams of future greatness. It is probable that a man could not live so happily (and, therefore, so effectively) under the unnatural and depressing conditions in which he often finds himself, if he had not in phantasy the power of escaping from them and from their depressing influence.

It is clear that in controlled thinking there is a process of selection by which ideas relevant to the situation in hand are allowed a place in consciousness, while irrelevant ideas are shut out. It might be supposed that in day-dreaming, in which this conscious control is taken off, the succession of thoughts would be merely habit sequences. But observation shows that the thoughts of the reverie, no less than the thoughts of controlled thinking, are determined by an aim, although this aim is not one that is voluntarily pursued. The deprivations which we suffer from environmental circumstances—the desires unsatisfied, the ambitions unfulfilled, and the intentions which have not been carried out—receive a phantasy satisfaction in the formation of day-dreams. In the terminology of Freud, day-dreams are wish-fulfilments.*

Varendonck has shown in observations of his own day-dreams before sleeping that, when the mind has a "wish" unsatisfied, the course of the day-dream will lead round to the fulfilment of that wish, whatever may have been its starting-point, *i.e.* one cannot avoid a particular line of day-dreaming by deliberately starting with a thought which is irrelevant.²⁹² This means that the course of phantasy thinking is determined by its end, and not by the thoughts started from.

Day-dreaming probably goes on in the minds of all persons. When we are occupied in action, such day-dreams as we have are on the margin of consciousness and are not attended to. It is only when our concern with our environment relaxes that they become an important feature in our mental content. Adaptation to reality is lost if phantasy assumes a more prominent position than this. The condition in which it does so is an extreme form of the state which Dr Jung describes as *introversion*†. This occurs most completely in the condition of insanity known as *dementia praecox*.

Not all thinking of the phantasy kind, however, is mere dreaming without effect on behaviour. The word *ideal* has been used for a phantasy of ourselves as we would be, if this phantasy is such as to influence our conduct. It should be clear that the day-dream and the ideal are essentially alike in their psychological nature, but we use the word "ideal" for a phantasy which is sufficiently related to the limitations of environment and opportunity to be an effective guide to action.

* Freud uses the word "wish" for any kind of impulse to behaviour whether consciously recognised or not. His theory of day-dreams is in its essence the same as his important and original theory of the nature of the dreams of sleep. He supposed the difference between them to be that the dreams of sleep are concerned with wishes which have suffered a greater amount of repression and are therefore more disguised.

† See p. 107.

A medical student may, for example, have a phantasy of himself as a famous orator moving crowds by his eloquence, or he may have a phantasy of himself as a famous and successful surgeon. Both alike may have the function of compensating for the unsatisfactoriness of the present situation. But the orator phantasy can have no useful outcome in behaviour (so long as he is pursuing his present course), while the surgeon phantasy may act as a stimulus to his harder study. For this reason we are inclined to make the value judgment implied by calling his orator phantasy a mere day-dream, while calling his surgeon phantasy an ideal.

CHAPTER XV

CONFLICT AND VOLITION

1. Mental Conflict

If the environment were so simple in its demands on the organism that at any one moment only one behaviour tendency was called into action, behaviour would be simple and predictable. This, however, is very often not the case, and the different elements in a complex situation will set into operation the tendencies of different behaviour patterns whose separate activities would be incompatible with one another. This is the condition known as *conflict*.

Simple conflicts between the behaviour of different instinctive tendencies may be observed amongst animals. Inquisitive animals, such as cows or deer, will often come as near as they dare to an intruder in their fields, looking intently at him but with bodies alert for flight if he should make an unexpected movement—their behaviour being obviously a compromise between the incompatible behaviour dictated by their curiosity and by their fear. A conflict between the behaviour impulses of submission and of flight may be seen in the case of the imperfectly trained dog who hears his owner's whistle but is afraid of being punished or fastened to the lead. He comes close, and one can see the alternative or simultaneous movements of his limbs calculated to take him towards or away from his owner, neither of these impulses being able sufficiently to take control of his motor apparatus to make him take either course of action to the exclusion of the other, so that he remains at a short distance from his owner with conflict portrayed by every muscle of his body.

We may distinguish three main ways in which a situation of conflict may be dealt with. (1) Two incompatible behaviour systems may both influence the organism at the same time, leading to action which is rendered ineffective for attaining the end of either system by their mutual interference. An example is to be found in the man who wishes to go for a walk while feeling that he ought to read a book but stays in his garden, torn between the two impulses but carrying out neither of the two alternative actions. Similarly, an animal in an experimental situation, wishing to reach a food chamber but deterred by having to pass over an electrified grid, may make ineffective rushes at the grid without

going over it (2) An action may be carried out which is a compromise between the behaviour tendency of each system, attaining the end of both systems but less effectively than if that system alone controlled behaviour. Thus the man may take a walk carrying the book with the intention of sitting down outside and reading it (3) One of the two behaviour tendencies may be translated into action while the other is not. The impulse sacrificed is then said to be *inhibited* or suppressed.

We have so far spoken of conflicts which are *episodic*, they occur over a short stretch of time only. One also speaks of conflict in the sense of something which is sustained over long periods, when, for example, a man has a sentiment, such as that of love for a particular woman, which comes into conflict with another sentiment, either his moral sentiment or his personal ambition. He is now in a sustained situation of conflict in which from time to time there will be episodes in which situations arise in which choice must be made between the behaviour dictated by the two behaviour tendencies. Such *sustained conflicts* are like wars of the mind in which the episodic conflicts are the individual battles.

The psychoanalytic theory of the origin of neuroses is that these arise as the result of failure to deal satisfactorily with a sustained conflict. Freud considered that the fundamental sustained conflict from which the psychoneurotic conditions arise was the conflict between the impulses of what he calls *sex* and *Ego*. He considered that a hysterical symptom, for example, was a compromise formation between these systems of impulses, *ie* a mode of behaviour which satisfies to some extent both the demands of the sex instinct and of the mental forces repressing the sex instinct, which does not, however, give a real satisfaction to the demands of either system. The origin of the psychoneurosis may be an attempt of the individual to deal with the conflict in the third way described above, by suppressing one of the competing systems and giving the victory to the other. That this may not be a satisfactory solution arises from Freud's conception of *repression*, that the inhibition, or suppression, of the one system does not lead to its disappearance but to its becoming unconscious and still influencing behaviour although the neurotic individual is not aware of its impulses and therefore has not conscious control of them. His neurosis is a compromise system of behaviour between two systems of impulses, one of which is of unconscious origin.

In the same way, the symptoms known as shell-shock in warfare are regarded as hysterical in origin and may be explained as a compromise between the incompatible demands of the gregarious and self-preservative systems of tendencies. This adaptation was

made by the development of a symptom which unfitted the soldier for action and so saved him from danger, but in a way which did not involve carrying out explicit behaviour of an unsocial kind, as running away

Rivers wrote "Among the most frequent results of shock and strain in war are paralyses, often accompanied by contractures and anaesthesias. The paralysis may attack almost any part of the body, but paralysis of speech is especially frequent, while the anaesthesias may affect not only the skin, but also the special senses of sight and hearing, and less frequently of taste and smell. All these occurrences have the common feature that they unfit their subject for further participation in warfare, and thus form a solution of the conflict between the instinctive tendencies connected with danger and the various controlling factors which may be subsumed under the general heading of duty"²³¹

There is no reason for supposing that in general the development of neurosis is due to the fact that the individual concerned is subject to more conflict than other people. Rather it is that he has a less satisfactory way of dealing with his conflicts. It may well be that in some situations, such as warfare, the conflict situation is so intense that individuals succumb to neurosis who would otherwise lead normal lives. More generally, the psychoneurotic has inborn tendencies, or tendencies acquired in early childhood, which predispose him to make adaptations of an ineffective kind. The relatively normal individual has sufficient power of renunciation of some of his behaviour tendencies to enable him to make this renunciation without bringing about the phenomena of repression to more than a very minor extent. He modifies the severity of his sustained conflicts partly by bringing them under systems of adaptation to the world as a whole. Such systems are, for example, his religion, his moral principles, or any other attitude towards the world as a whole which serves the same function as religion. This capacity for effective renunciation of instinctual impulses is one of the fruits of a religious attitude.

2. Animal Experiments on Conflict

The competition of mutually incompatible impulses on the physiological level was studied by Sherrington, using *antagonistic* reflexes in a spinal dog²⁴⁶. The *scratch reflex* can be elicited by stimulating any part of a saddle-shaped area on the dog's back. If this is done on the left side of the dog's body, scratching movements are made with the left foot. A stimulation of the right foot which would normally produce an extension of the left foot, will cut short the rhythmical flexions of the scratch reflex. There is

interference between the two reflexes, for this extensor reflex requires steady excitation of the extensor neurones of the left leg and steady inhibition of the flexor neurones while the scratch reflex requires rhythmical excitation of the extensor neurones. This interference produces inhibition of the scratch reflex. The extensor reflex could be similarly inhibited by the scratch reflex.

What does not happen is a simultaneous appearance of both reflexes resulting in a movement which is a compromise between the two. Such a compromise would clearly not be adaptive, for the movement would attain the end of neither reflex. If the dog were threatened with injury to the right foot while he was scratching a flea with his left, he would either put his left foot down to bear the weight of his body while he withdrew his right foot (the purpose of the extensor reflex), or he could go on scratching his flea by keeping his right foot still. A compromise would be useless, for an incomplete extension of the left foot accompanied by an incomplete scratch would neither injure his flea nor save him from falling over.

Ineffective behaviour resulting from compromise between conflicting behaviour tendencies has, however, been observed in intact animals. Masserman, for example, found that if cats were trained to open a food box to obtain food and afterwards they were met with a puff of air when they opened the food box, they showed abnormalities of behaviour which he attributed to the conflict between the impulse to obtain food and the impulse to avoid the puff of air.¹⁸⁸ Instead of opening the box at the ordinary signal, they ran about the cage in an undirected manner. The abnormality of behaviour was not confined to the food box since they showed also general inertness and absence of other instinctive responses, *e.g.* they lost interest in mice when these were exposed near to them.

Such abnormalities of behaviour are now commonly called "animal neuroses", and a good deal of current research interest is centred on such phenomena since it is felt that their study may throw light on the origin of human neuroses and may give guidance as to effective methods of cure. Such experiments as those of Masserman, in which abnormality of behaviour arises from the recurrence of a conflict situation, obviously lend support to Freud's theory of the causation of human neuroses by sustained conflicts. It must be remembered, however, that it is by no means certain that these artificially produced abnormalities of animal behaviour are of the same kind as the neuroses of human beings. The use of the term "animal neurosis" assumes, perhaps unjustifiably, that this is the case. It may be safer at present to refer to them by some non-committal term such as Russell's "aberrant behaviour".²⁴⁰

It is also to be noted that somewhat similar aberrant behaviour has been produced by methods which do not apparently involve conflict *e.g.* it was first observed by Pavlov in the course of experiments on the conditioned reflex when the experimental animal was trained in a discriminatory response with two stimuli too much alike for the animal to discriminate between them,²¹⁰ and Liddell has produced aberrant behaviour in sheep by giving them a mild electric shock with a constant time interval.¹⁶⁸

3. Conflict in Thought

On the level of action, two incompatible behaviour systems cannot usefully find expression simultaneously. The dog in conflict between the impulse to obey his master's whistle and to run away, is an example of two incompatible behaviour systems taking possession of the muscles at the same time. But this is a condition of ineffective action, it attains the end of neither system. When the two impulses both exist in thought alone, we have the condition known as *doubt*.

A condition of doubt tends to pass into a condition of *belief* (in which one of the competing opinions is adhered to while the other is rejected) for two reasons. First, the condition of doubt is itself an unpleasant one, and the mind tends to pass spontaneously into a condition of belief in order to relieve itself from the unpleasure of doubt. Secondly, the demands of action necessitate the following out of the behaviour belonging to one opinion or the other. The doubt about whether one is a Socialist or a Conservative may persist as long as these two opinions are merely intellectual, but, when an election comes, one must vote on one side or the other. To allow both opinions to find equal expression in one's voting would be to abandon effective action altogether.

When for either of these reasons the mind passes from doubt to belief, it is usual for the intellectual case for the rejected opinion to pass from the mind altogether. A feeling of subjective certainty about the opinions one embraces may be a compensation for objective uncertainty of their truth. Subjective certainty or the refusal to see both sides of a case is the response of our minds to the demands of action. Its compensatory function is shown by the fact that when cherished beliefs begin to be undermined, our immediate response is often an increased strength of our apparent certainty of them. Immediately before a conversion the convert is often most bitterly antagonistic to the cause he is about to embrace.

The peculiarity of conflict in thought is a possibility of the continued retention in thought of both of two opinions leading to incompatible behaviour. That there are strong forces opposing

such simultaneous holding of incompatible opinions is shown by the experimental finding that, where two opinions on a question are possible, the majority of people tend to hold either one or the other opinion with complete certainty, while any degree of uncertainty is relatively rare²⁸⁰ On the other hand, the capacity for retaining an attitude of incomplete certainty with respect to the choice between two opinions is a valuable one in the process of forming a correct judgment This may be true even in the choice between opinions on which action must be taken It may be necessary to take action on the side of what appears to be the more probable opinion without losing sight of the fact that this opinion may prove in the end to be the wrong one To do this, however, is to act against the normal tendencies of the mind and must be the product of training

4. Impulsive and Volitional Action

It appears to common observation that there are two ways in which we may deal with the impulse to behaviour which results from the activation of some tendency If the impulse is allowed freely to discharge itself in behaviour, the resulting action is *impulsive* If, on the other hand, we decide to check the impulse and so prevent its behaviour from being carried out, this inhibition is *volitional*

Similarly, if the situation is one which arouses a conflict between impulses, and this conflict is allowed to resolve itself without interference from the self or Ego, so that the strongest impulse results in action or some compromise behaviour is adopted, we have again impulsive action If, however, we decide to follow some other line of conduct than that which is dictated by the strongest impulse of the competing system, *i.e.* if the strongest impulse is voluntarily inhibited and some other impulse is voluntarily reinforced, the resulting action is volitional action

We are not, for the moment, concerned with whether these two kinds of behaviour are really distinct but only with the distinction that appears to exist between them to common observation, which also is made between them in ordinary speech Many currently accepted explanations of volitional action refuse to accept this distinction as real and are, in effect, methods of explaining volitional action as a kind of impulsive action I believe that these attempts are mistaken for reasons that will be discussed later

There can be no doubt as to the apparent difference between these two classes of behaviour, and we do not find in ordinary life any great difficulty in distinguishing, at any rate in extreme cases,

between the things we are inclined to do and those which we have to force ourselves to do. For example, a man may take his dog for a walk on a fine evening because a walk is a more immediately attractive course of action than remaining indoors. On a wet, cold evening, on the other hand, the fireside may be much more attractive. He may obey the impulse to stay by the fire, or he may force himself to go out. If these two kinds of behaviour are really of the same kind, they certainly do not appear so to the person carrying them out. He expresses the difference, if he is a psychologist, by saying that the second is a "volitional action", alternatively, he may say that he has carried out an act of "will", or an "act of the will".

The formulation of volitional action as an act of the will may reasonably be objected to because it seems to imply that volition is a result of the activity of a special part of the mind—the faculty of will. This may not have been what was meant in the past by those who spoke of the faculty of will, but it is a possible implication of "the will", so this term is better avoided. If we admit volitional activity to the status of a special kind of activity, we must regard it as an activity of the Ego or self as a whole and not of some special part of the Ego.

Volitional effort may be directed towards the inhibiting of an impulse which is the result of an external situation or of one which is the product of the individual's native or acquired dispositions. Let us suppose, for example, that a man is lying in bed at night during a war when he hears the sirens which announce that an air-raid is expected. If he is a timid man, his strongest impulse may be to jump out of bed and go down to the cellar. If he does so, his action is an impulsive one. For various possible reasons, good or bad, however, he may decide to resist this impulse. He may have an ideal of himself as calm and indifferent in danger. So by volitional effort he inhibits the impulse to go down, and, instead, stays in bed. If the impulse is very strong, or if his capacity for volitional effort is small (*i.e.* if he is "weak-willed") he may find himself unable to carry out his decision and may go to the cellar in spite of it.

His neighbour, on the other hand, may differ so much in temperament that he is acted upon by a different set of impulses. Instead of being timid, he may be lazy, comfort-loving, or mentally inert. His previous experience of air-raids in which no harm has come to him may have weakened the fear response so that his strongest impulse is to stay in bed. If he gets up and goes to the cellar, he does so by exerting volitional effort to overcome the impulsive tendency to stay where he is.

It is necessary to avoid the error of supposing that a volitional action is always better than an impulsive one. It is true that we attach moral valuations to volitional activity or to the failure to exercise volitional control over impulsive action. "Sin" may be defined as the volitional consent to a wrong action. Moral valuations are therefore bound up with the psychological problems of volition, and it is difficult to see how such concepts as sin and moral responsibility can have any meaning for a theory which treats volitional action as a kind of impulsive action.

The relation is not, however, that volitional action is necessarily morally superior to impulsive action. There is a misleading tendency of psychologists to illustrate the problems of volitional action by taking as examples such activities as getting out of bed on a cold morning, where the exertion of volition can be regarded as leading to morally superior activity to the impulse which is overcome. One can as easily find illustrations in which the impulsive action is the morally superior. A mother whose young child falls into the river may find that her strongest impulse is to jump in after it. If she does so that will be an impulsive action. Normally that will be a better thing to do than to make the volitional effort necessary to stay on the bank. Volition may also be used in the service of conduct which is morally wrong. As much volitional effort may be expended by a murderer in overcoming his impulsive sympathy for his victim or by a burglar in entering a house, as is used by a soldier in overcoming his impulse to run away, or by a fireman in facing a fire.

5. Strength of Will as a Personality Trait

It is a common opinion that "strength of will", *i.e.* capacity for volitional control of behaviour, is a personality trait of considerable importance which differs in amount from one individual to another. It is also commonly supposed that it is a trait which can be strengthened by use and weakened by disuse. This second opinion still lacks experimental confirmation although it may well prove to be true. There is now, however, a considerable body of evidence in favour of the truth of the opinion that capacity for volitional control is a personality trait whose amount differs in different individuals.

The common observation on which this opinion is based is that it seems to us that one man seems to be swayed by external things and by his own impulses, while another seems to have the power of opposing and controlling them. The first man abandons effort when he meets with an obstacle and becomes violent when he is angry, the second man also meets external obstacles and impulses

to violence, but he continues his efforts in spite of the obstacle and can check his impulse to violence when he is angry. The latter is spoken of as a man of strong will. He may, of course, decide on a particular occasion to allow his anger to express itself in violence. When we say that he has strength of will we mean that he seems to be able to decide whether his anger shall be expressed in one way or another. Our total impression of his character is of control, of a certain capacity to decide whether to oppose or to give way to the forces both from outside and from inside which tend to give direction to his behaviour. The weak-willed man, on the other hand, seems to be much more at the mercy of these forces.

The personality trait which corresponds to this quality is generally called *persistence*. The capacity for persisting in a task when other people would give it up is one aspect of capacity for volitional control which has the advantage that it may without much difficulty be measured. The first indication that there was such a measurable trait of character came from the work of Webb, who analysed a factor he called w from a number of test performances.²⁹⁹ One of the characteristics of the individual with high w factor was persistence and perseverance, in contrast with the fickleness and instability of individuals with low w . More recent work has measured the length of time during which subjects carry on difficult tasks or continue with such an exertion as holding up a heavy dumb-bell level with the shoulders. It appears that there is sufficient correlation between these measures to indicate a possible direction of personality measurement.

Perseverance in this sense must not be confused with the different personality trait of *perseveration*, or *mental inertia*, which is measured by the degree of difficulty a subject finds in starting a new task, or stopping an old one, or switching from one task to another. The man of strong perseverative tendency may be conspicuously successful in overcoming external obstacles, but there is no reason for regarding him as of strong will. It is the function of volition to control internal forces as well as to master external obstacles. The evidence which points to strength of will is not only that a man can overcome external objects when he has chosen to go on, but also that he can inhibit his own perseverative tendencies when he has chosen to stop. The individual who shows abnormally great perseverative tendencies may well be one who has insufficient volitional control over them.

The range of behaviour over which volitional control can be exerted probably depends on training, although there is little exact knowledge on this topic. Normal persons can control some simple reflexes, such as withdrawing the hand when pricked, and the

regular action of the lungs, but not others such as the contraction and dilation of the pupils, and the beating of the heart. Most of us can control the impulse to physical violence when we are angry, unless the impulse attains very unusual strength. The child has very much less control of his impulses, and the process of growing up is accompanied by a progressively greater capacity for voluntary control.

Many systems of "mental culture" have as their aim the bringing of responses more completely under volitional control. It seems very likely that mental exercises can be used successfully for this purpose. Habitual control of impulses may make this control easier. Such habitual control is at the base of all forms of asceticism. The ascetic practises control in indifferent matters so that it may be easy for him to control his behaviour in important situations.

Voluntary control is of importance only so far as it is of value in our adaptation to our environment. It is important for our adaptation to our social environment that we should be able to control the crude, primitive conduct of anger. It is of no adaptive value that we should be able to control the beatings of our heart. The tendency of evolution has been to make automatic those bodily and mental adjustments which cannot usefully be controlled and to extend volitional control where control is useful. There is no doubt that, in his complex environment, the extent to which man can voluntarily control certain of his responses is of the very highest value. It is, of course, arguable that we should be the better for increased power of voluntary control in many directions, although there seems to be no ground for thinking that the complete replacement of automatic functioning by conscious control would be a reasonable aim even if it were an attainable one.

6. The Nature of Volitional Action

The essential difficulty about the acceptance of volitional activity as different in kind from impulsive activity is a consequence of regarding the sequence of behaviour of an individual as a causal system in which the activity at any moment is determined by preceding conditions by external stimuli or internal dispositions or an interaction between these. The determination of behaviour would then appear to be complete when these conditions are specified and no room is left for volitional determination of behaviour which, by definition, is a determination by a factor not specified in these preceding conditions. If what a man will do when faced by a choice between sitting by the fire and going to a political meeting is determined by the warmth of the fire, the

coldness of the air outside, his expectation of boredom at the meeting, his political attitude, his attitude towards indulgence in sloth, and his attitude towards public service, then if we knew perfectly the strength of all these factors, it might seem we could perfectly predict what his behaviour would be, without postulating a volitional decision of the man one way or the other which might upset our prediction

All psychological theory is an attempt to bring such order into human behaviour as to make behaviour so far as possible predictable. We have, on the other hand, no grounds for expecting that any system of theory will make it wholly predictable. The movements of billiard balls on a billiard table after the player has struck his ball follow physical laws which would theoretically enable us to predict their final position after the stroke. But this system of physical laws does not enable us to predict what stroke the player will decide to make.

There is, nevertheless, a prejudice that leads us to expect that any principle of explanation accepted for the greater part of behaviour must also explain the whole of behaviour. When psychologists accepted the explanatory principle of psychological hedonism (that behaviour was determined by the expectation of pleasure) they did not abandon that principle when they noticed that men sometimes adopted the course of action that appeared the less pleasurable, when, for example, they left the pleasurable comfort of the fireside for the unpleasurable discomfort of going out. One may save the principle of hedonism by saying that in this case the unpleasure due to self-reproach if he stays indoors outweighs the pleasure of staying by the fire, so the behaviour of going out is really the more pleasurable although it does not appear so to the person carrying it out.

This is an example of a hypothesis becoming valueless for the purpose of prediction by making it completely flexible. If we mean by "pleasure expected from a course of action" some quality of the course of action other than the fact that the action is carried out, then the proposition that we carry out those courses of action from which we expect the most pleasure is meaningful and valuable for the prediction of behaviour. If, however, we have no way of finding out which line of action is the one from which the more pleasure is expected except by seeing which line of action is carried out, the hedonistic principle reduces to a mere tautology of two alternative courses of action that one will be adopted which is adopted.

Other similar explanations of volitional action are open to the same objection of being tautological. Titchener said, for example,

"it is always the strongest impulse that wins, though it is not necessarily the impulse that looks the strongest to psychological observation" ^{286a} This sounds like a proposition of the same kind as that if two weights are suspended over a pulley, the heavier will fall and the lighter will rise. This, however, is meaningful because we can find out which weight is lighter and which heavier apart from observation of their behaviour on the pulley, the heavier will, for example, weigh more if placed on a spring balance, and it will attain less velocity than the other when both are acted on by the same force. But it is clear that if we have no way of knowing which was heavier except by observing which went downwards when they were suspended over a pulley, there would be no meaning in the statement that the heavier went down. We might, indeed, use this property as a definition of the sense in which we were going to use the word "heavy", but the statement would give us no new information about the weights. Now, it is clear that we have no independent way of saying which is the stronger impulse. It is not the impulse with the greater amount of pleasure attached to it, and it is not the one which appears stronger to introspective observation. So the statement that the strongest impulse always wins merely reduces to the form that the impulse that wins always wins, which clearly gives us no guidance as to how a decision will be made when two impulses to behaviour are in conflict with one another.

We may turn to a different treatment of volition, that of William James ¹³³. A propensity, he says, may be stronger than the ideal impulse which opposes it. In a volitional action something is added to the weaker ideal impulse which makes it outweigh the propensity*. He puts this in algebraic form. Let P equal the propensity, I the ideal impulse, and E the effort (what is added to the ideal impulse by the act of volition)

then $P > I$,

but $I + E > P$

* William James speaks as if volitional effort were necessarily on the side of an ideal impulse opposed to a propensity. The reason appears to be that he follows the Puritan tradition of identifying moral action with volitional action. Thus he says "ideal or moral action is action in the line of the greatest resistance". We have already argued that action in the line of the greatest resistance may not be moral action. Most of us would find that greater volitional effort was necessary to commit a burglary than to give money to a charity. Nor does there seem good reason for James's implied identification of ideal action with moral action. Moral action may be dictated by a propensity and immoral action by a system of ideas (as, for example, by the anti-semitic system of ideas). Also volitional effort may be exerted on the side of a propensity and to inhibit conduct proceeding from a system of ideas.

This formulation represents, James says, how the mechanism of volition appears at first sight. He does not seem to have regarded this algebra very seriously. The effort which is added on the side of the ideal impulse is, he considers, an act of attention to a difficult object, and the holding of it fast before the mind. We overcome the resistance to getting up in the morning by a voluntary holding before our minds of the idea of getting up, and it is, he says, a mere physiological incident that when it is thus attended to the immediate motor consequence of getting up should ensue.

The general principle that movement is the automatic result of thinking of the movement to be carried out is called the principle of *ideomotor action*. James's explanation of willed behaviour may be called the *ideomotor theory of volition*.

It will be noticed that it does not get over the difficulty of how volition can apparently drive behaviour along the line of greatest resistance. It simply shifts this difficulty to a different point. On this theory we make volitional decisions by altering the train of thought. How, then, do we alter the train of thought? If staying in bed is more immediately attractive than getting up, is not the thought of staying in bed more attractive than the thought of getting up? The ideomotor method of carrying out willed behaviour can only work if voluntary effort is capable of overcoming the impulse to dwell on the more attractive or pleasant of two lines of thought. The theory does not get rid of the necessity for regarding volition as an effective force.

McDougall, in his *Social Psychology*, accepted James's general statement of the problem, but considered that the *E* which makes the ideal impulse outweigh the propensity is an impulse aroused within the system of the self-regarding sentiment,* such as the thought of the injury that would be done to our idea of ourselves if we were overcome by the discreditable impulse to remain indolently in bed.¹⁷⁵

Such explanations owe their attractiveness to their apparent success in explaining volitional action as merely a kind of impulsive action in which the apparently weaker motive has had some added

* The completeness with which McDougall in this book identified volition with the activity of the self-regarding sentiment is shown by the fact that he defined volition as "the supporting or re-inforcing of a desire or conation by the co-operation of an impulse excited within the system of the self-regarding sentiment". It is true that in a later book,¹⁷⁶ he put forward the more adequate view that "will is character in action", i.e. that in volitional action we bring the whole organisation of tendencies which we call "character" to bear on the situation which demands action. This formulation still seems to be open to the objection that it blurs the distinction between impulsive and volitional action. The volitional act was still regarded as the automatic outcome of the conflict of impulses but of impulses that have come from the whole organised system of dispositions and not only from one part of it.

strength through being allied to some other system of motivation and thus attains its success in influencing conduct through its impulsive strength and not through any influence of a volitional force. This success is only apparent since one is left with an unexplained step unless one assumes the effectiveness of volitional effort. McDougall's expression "throwing an impulse into the scales" obviously implies that volitional effort has changed the sequence of thought.

If we consider the behaving organism as acting in a field of forces which produce tendencies towards various lines of action, as, for example, is postulated by Lewin,¹⁶⁶ it does not follow that we must reject as illusory the appearance of self-direction of activity in volitional action. We may, on the contrary, suppose that the Ego or self can itself create stresses within the field, which themselves play a part in determining what action is carried out.

The reasons which have caused many psychologists to regard this view as obviously untenable seem to be a relic of the mechanistic thinking which resulted from men's habits of thought having been, from the time of Descartes, dominated by the problems of the physical sciences. This method of thought led to the conviction that the human organism is a physical system which, like other physical systems, must have its future state wholly determined by its present state and the external forces acting on it. This conviction had no firm logical foundation at any time, since it was obviously possible that the human organism might differ from other physical systems in the fact that its future states were not wholly so determined. What force the argument had is now much weakened by the consideration that this is not a necessary truth which holds for all physical systems but only a sufficiently close approximation for macroscopic physical systems. For atomic events, it has been shown by Heisenberg that the principle of causal determination cannot hold and that future states of systems of the atomic order can only be predicted with a degree of probability that falls short of certainty.

Acceptance of volition as an effective determinant of behaviour does not, of course, imply that human behaviour is entirely unpredictable in terms of external situations and internal dispositions. If it were so, there would be no science of psychology. Not all human behaviour is volitional, and the forces contributed by volition are often weak compared with those of well-established attitudes, particularly those based on innate tendencies. Strong efforts of will have enabled men to refuse food when hungry, to deny themselves love and the companionship of others. More commonly the attractive forces of these things are stronger than

any volitional effort made to resist them. Volition exerts a kind of rudder action on behaviour, using small forces, not to control the major forces from the emotional systems but allowing these so much free play as is consistent with the maintenance of a chosen general line of behaviour.

Nor does the acceptance of volitional determination of behaviour imply that volitional behaviour is necessarily unpredictable. Our voluntary decisions have obviously a certain amount of consistency which is due to our acceptance of certain rules or principles to govern our behaviour. I may accept the rule of honesty and refuse to take what is not mine when I feel impelled to do so. If I go on following this rule long enough, I may not even feel any longer impelled to take what is not mine. Previous volitional decisions have now formed a habit system, so that in such situations volitional decisions are not longer necessary. Even when they are necessary, others may predict their result with a certain amount of success. Not normally with complete success, for none of us are completely consistent in the rules of conduct we follow.

Since volitional forces are relatively weak, and a somewhat disagreeable effort is required to overcome volitionally a strong impulse, we may adopt devices directed towards economy of volitional effort. William James apparently made volitional decisions by paying concentrated attention to the line of conduct that had to be carried out, McDougall by throwing on the side of the favoured impulse motives derived from his self-regarding sentiment.

We may consider these as not descriptions of the essential character of volition but merely as accounts of individual devices for facilitating the carrying out of a volitional decision. There are probably others. At one time, for example, I found myself unwilling to carry out a decision because it would have disagreeable consequences. I found that by paying concentrated attention to these consequences they seemed to become less unendurable, and I made my decision with ease. The Stoic Emperor Marcus Aurelius Antoninus wrote "When you find an unwillingness to rise early in the morning make this short speech to yourself. I am getting up now to do the business of a man and am I out of humour for going about what I was made for, and for the sake of which I was sent into the world? Was I then designed for nothing but to doze and to keep warm beneath the counterpane? Is not action the end of our being?"¹²

The general aim of economising effort leads us all to make our volitional efforts easier in some such way, unless indeed our aim

is to maximise volitional effort for the sake of strengthening our general capacity for making such efforts, *i.e.* of increasing our strength of will. Then we may say to ourselves "It is cold and wet, I shall be thoroughly miserable if I go out, while I should be happy by the fire. I am going out all the same." That is volitional effort without any device to make it easier. For ordinary life it is unnecessarily strenuous.

7. Principles and Ideals

The mere random exercise of the capacity for volitional action would be of no service in adapting the individual to his environment. Its value lies in the fact that consistency in volitional decisions can give some other general direction to behaviour than that which would be the result of the interaction between the environment and the innate or acquired behaviour tendencies. Thus the habitual volitional effort of men to overcome their impulses to physical aggression when they feel themselves slighted or frustrated helps towards the attainment of a closer social co-ordination than would be possible if these impulses were unchecked or even if they were checked only by the impulses derived from social attitudes.

To secure the maximum consistency of volitional actions, it is necessary that these should be guided by general principles of conduct or by Ego-ideals. By general principles of conduct are meant verbalised formulations of general directions of behaviour, such as the principle of not causing unnecessary unhappiness to other people, and of being honest or truthful. By an Ego-ideal is meant a phantasy of oneself as one would like to be*. Thus a man may check his impulse to run away in danger either because he has formulated to himself the general principle that he will not run away, or because he pictures himself as a hero or identifies himself with a particular hero.

These two methods of giving consistency to volitional behaviour lead to two methods of education directed towards inculcating the

* Neither "general principle" nor "Ego-ideal" is here used with any moral implications. A man may have a "general principle" of being offensive to those he regards as his inferiors, and he may have an Ego-ideal of "man of the world" or some film star. Like volitional action itself, the general principles which guide it may be good, bad, or morally indifferent. Probably trivial Ego-ideals are amongst the commonest sources of worthless general patterns of behaviour. "The pitiable models on which people form themselves." Once it was the Imitation of Christ—now of Hollywood" (*Eyeless in Gaza*, Aldous Huxley). It is often said that so-and-so is a "man of principle" or a "man with ideals" as if this were equivalent to saying that he is a good man. The mere possession of effective principles and ideals only guarantees consistency of conduct. If we wish to know whether such a man's conduct is good or socially valuable, we must also know what principles and ideals he has chosen to follow.

ethos of the social group to which the individual belongs. General principles of conduct may be inculcated by moral maxims which are verbal formulations of admired lines of conduct. Ego-ideals are transmitted partly by example, partly by means of stories. A young child, noticing that his parents or other senior and respected members of his social group express and show approval of some kinds of personality while showing disapproval of others, tends to accept such judgments and make them his own. This is also one of the functions of the stories told both in primitive and more advanced communities by members of the group to each other, and more especially to children. Malinowski mentions as one of the functions of myth in primitive cultures that it "safeguards and enforces morality"¹⁸³. This function is also seen in the stories we tell our own children, there are heroes whose conduct is held up for admiration, and villains whose conduct is condemned. The ethos of a social group is partly revealed by the kind of stories it tells its children. It is probable that such stories are rarely constructed with the deliberate intention of displaying admired and reprobated types of personality, rather the standards of personality evaluation of the constructors of the stories are unwittingly woven into the stories themselves.

It is likely that the inculcation of Ego-ideals is a more effective way of influencing the pattern of volitional behaviour than the presentation of moral maxims. We may more easily teach children not to run away from danger by telling them stories of explorers and soldiers showing courage than by giving them the moral rule "Never run away from danger". Confusion and ineffectiveness in moral teaching is likely to result from conflict between the patterns of behaviour inculcated in different ways. If a child lives, for example, in a Christian acquisitive-competitive pattern of culture, he may find that his preceptors give him the maxims of the Sermon on the Mount as his principles of conduct, while he notices that those preceptors themselves show esteem for individuals of an acquisitive and aggressive type of personality whose conduct is ruled by the voluntary acceptance of a very different set of principles. The results of such a conflict between the principles inculcated verbally and those implied by the behaviour of those inculcating the principles is illustrated by a study of Manske¹⁸⁴ reported by Krech and Crutchfield. The content of school textbooks inculcating a liberal attitude towards racial problems was found to influence high-school pupils in the direction of racial tolerance when taught by teachers who were themselves racially tolerant, but the same material had no effect on the attitudes and

beliefs of the pupils when the teachers themselves were racially prejudiced

If we apply the principle that the ethos of a society is reflected by the stories told to its children, it is interesting to consider what judgment as to the ethos of our own society would be indicated by the stories we tell our children in the cinema and other cultural substitutes for the folk tales of primitive societies. It appears that in this matter we have no very clear aim and that in consequence we are not likely to achieve any desirable result. The influence of the cinema on the development of children's ideals is an important practical problem for psychological research which is now receiving some attention.

CHAPTER XVI

SOCIAL BEHAVIOUR TENDENCIES

1. Basic Factors in Social Behaviour

Everywhere we find men in groups of which the individual members are partly co-operating with each other for common ends and partly in rivalry with each other. Some writers (as Hobbes)¹²¹ have supposed that his inborn nature is such as to lead man always to be in rivalry with his fellows, while co-operation is only an acquired condition which results from fear of a sovereign authority. Others (as Kropotkin)¹⁰⁷ have argued that man's co-operative behaviour is shared with the lower animals and is truly instinctive and that his hostile behaviour towards his fellows is a condition acquired as a result of the constitution of the society in which he lives. Some writers have attributed the whole of man's socialised behaviour to the operation of a single instinct often called *the herd instinct*²⁸⁸

The theory of a single instinct determining the fact and the form of human social organisations may safely be rejected. Human grouping is probably partly dependent on many different factors inborn in man's mental constitution, not on one unitary instinct. It is true that we find widespread in the animal kingdom a tendency for members of the same, and occasionally of different, species to herd together. This has been called the *gregarious* or *herd* instinct and is found amongst some mammals, birds, fishes, and insects. Since it is found in some animals and not in others, a distinction has been made between *gregarious* and *non-gregarious* animals. No sharp line can, however, be drawn, since some animals, such as the migratory birds, flock together at some seasons and not at others, some, like wolves, herd together only exceptionally and are more generally solitary or in family groups. Since, moreover, family groups may be large or small, and either more or less permanent, there is obvious difficulty in drawing the line between a herd and a family group.

The gregarious mode of life is found to a considerable extent amongst the nearest animal relatives of mankind. Both chimpanzees and gorillas are found in herds which may consist of several family groups.¹¹ Isolation seems to create for them an unpleasant stress, only relieved by getting back to their own kind. It is probable that man also is innately gregarious, and the extreme

unpleasurableness of continued isolation from other men is partly inborn, although it may be made stronger by the accustomed conditions of life in close contact with his fellows. The strength of this tendency to desire close contact with other people seems to be a characteristic which differs in strength in different individuals, so the personality trait of gregariousness-solitariness is commonly listed amongst the individual differences in personality which must be estimated in a personality assessment¹⁰. Mere gregariousness, however, explains little that is of importance in human social behaviour—little more than that men in varying degrees tend to form crowds and to be uneasy in forced solitude. The full complexity of human social adjustments requires many other explanatory principles for its explanation.

Social life of great complexity is found very much lower in the animal scale amongst the ants, termites, bees, and wasps. In all of these insects, colonies are found which are generally the offspring of a single female, and are mainly composed of unfertile females who care for the young and do the work of the nest. The single laying female is commonly called the *queen*, although *mother* would be a better term. Sometimes there is not simply a single caste of workers but several structurally different castes performing different functions in the nest. A larger insect than the worker, for example, is found amongst termites and some ants, and is called the *soldier*.

There are many analogies between ant and human societies, which have at all times provided parables for the moralists. Some species of ant grow fungi for food, while others tend aphids¹¹. Some ant nests contain parasitic beetles which are cared for by the ants but in return only secrete a sweet liquid for their hosts and eat the ants' young. Some ants which are large and powerful make slaves of other species but are incapable of surviving without slaves. All of these activities suggest parallels with human societies, but the parallel is a mere resemblance. Ant societies differ fundamentally from human societies in that they are based on automatic social instincts, of which certainly there are none amongst human beings, although there are probably many innate characters of man which predispose him to the acquisition of social habits and of social attitudes.

The innate dispositions of men which adapt them to a social environment are many. There are, for example, the sensitiveness to other persons' opinions, which we call *suggestibility*, the sensitiveness to other persons' feelings, which we call *sympathy*, and the readiness to follow other persons' courses of action, which we call *imitation*.

Other social reactions are the disinterested emotions, and the shame which one member of a group feels when he has broken a social convention, particularly if social disapproval is expressed by other members of the group. It will be noticed that all of these reactions are ways of adapting the individual to a social environment. Harmonious and effective social grouping is dependent on the presence of these tendencies in the individual members of the group.

It is only in the sense that he possesses these peculiarly social behaviour potentialities that we can speak of man as innately social. Certainly we cannot explain the particular course of social life revealed by the history of mankind by referring it merely to a system of social instincts. The actual forms of social life in civilised and in uncivilised communities have been largely determined by the external circumstances of cultural development (such as inventions, invasions, etc.) and by economic forces. Nevertheless, it is improbable that any such non-psychological forces could have formed men into coherent and stable social groups if they had not possessed inborn tendencies which predisposed them to social grouping.

2. Suggestion and Suggestibility

The word *suggestion* is now commonly used for the process by which an attitude towards a system of ideas is communicated from one person to another by a process other than that of rational persuasion. It is found that, if a statement is repeated frequently and confidently, the person hearing the statement tends to believe it, or, if it is a command, to translate it into action, without sufficient rational grounds for doing so.

This process is seen in its most striking form in the suggestions given by a hypnotiser, and an actual hallucination may be produced by this method in a hypnotised person. The hypnotiser, for example, may tell his subject that the matchbox at which he is looking has changed into a fox terrier, and the hypnotised subject will then react to the matchbox as if it were a fox terrier, and apparently actually sees it as one. Some writers on this subject, as for example Janet, would restrict the word *suggestion* to these cases in which an imposed idea, possibly of an absurd kind, realises itself in consciousness with a completeness which is impossible in a normal mind.¹³⁷

The word, however, is now used in a much wider sense. When people are influenced to give their votes in an election by seeing hoardings covered with repetitions of the command "Vote for Snooks", or when they are induced to buy a particular article by a mere confident repetition by the salesman of statements of its

merits which they have no rational grounds for believing, they are said to be acted on by the method of *suggestion*. The three conditions favourable to the effectiveness of a suggestion of this kind are (1) its frequent repetition, (2) the use of a confident tone of voice in making the suggestion, and (3) the possession of *prestige* by the person making the suggestion. Prestige is not a trait of the individual's own character but of the attitudes of other persons towards him. It is the social esteem in which he is held as it appears to the person receiving the suggestion.

That the capacity for reacting to suggestion has as its primary biological function the fitting of man for social life is rendered probable by the observation that the influence of suggestion from one's social environment is stronger than that from any individual. Recognised systems of belief accepted by all the members of the social group in which an individual lives tend to be accepted without criticism by that individual. It is rarely that we have sufficient data for forming opinions of our own on questions of politics or international affairs, and most of us are content to take these opinions at second hand from the persons who surround us. In fact, it may be noticed that those opinions most purely products of herd-suggestion are held with the greatest ardour, while opinions formed more individually by weighing evidence and coming to conclusions are held more tentatively. If this is the true root of suggestibility it means that suggestion is a social phenomenon whose function is to produce the unity of action which is essential in an effective social group.

If, however, we accept the view that suggestion is primarily a social phenomenon, we are left with the task of accounting for the kind of suggestion which is given by one individual to another (as by the hypnotiser to his patient). This may be explained as the response of a social being to the group leader. Amongst herding animals, it is commonly found that some individuals have the function of initiating herd action. Other members of the herd willingly accept the lead in matters of conduct from such herd leaders. So the individual human being acting on another by suggestion is utilising the other's tendency to respond by acceptance to directions of thought and conduct suggested to him by a group leader. He is taking the position of leader. The artificial methods used to increase the prestige of the persons from whom suggestions are to be received, such as the scarlet gown of the doctor (which was at one time worn when treating patients) and the distinctive uniform of the officer, all have the effect of raising to the position of a leader the person from whom suggestions are received.

Since human reaction to leadership is not a simple thing but includes the capacity for rebelling against the authority of a leader as well as the capacity for passively following him, a too-powerful attempt to impose a suggestion may result in its rejection by the person to whom it is made. This mode of reception of an attempted suggestion is known as *contrasuggestion* ^b

Thus a judge who indicates to a jury too definitely how he expects them to return their verdict may be surprised to find that he has roused this attitude in them and that they return a contrary verdict which is not justified by the evidence. A too-aggressive manner in a person making a suggestion, which makes his hearers conscious of the fact that he is trying forcibly to impose his views on them, is liable to rouse the same response [†]

A persistent attitude of contrasuggestion is called *negativism*. It is found in an extreme form as a symptom in some types of the mental disorder of dementia praecox. Negativism is also a phase passed through by many children. In no case is it likely that persistent adoption of the response of contrasuggestion is a sign of the absence of the influence of suggestion. Rather it is to be regarded as a protective mechanism against the patient's tendency to accept suggestions.

There are undoubtedly great differences in the extent to which different individuals are influenced by the method of suggestion. Some individuals' opinions and beliefs are very fluid to the moulding influence of mass expressions of opinion or to confident assertion by another person. These are the highly suggestible. Some others are relatively unaffected by these influences. Extreme suggestibility is found in the disorder of hysteria, in which the symptoms of bodily illnesses and such disabilities as blindness, deafness, and paralyses, are found in the absence of any organic cause. These symptoms have been explained as due to suggestions of the patient's disability either given by himself or by other people ¹³⁷. The symptoms can often be removed by suggestions given by a psychotherapist either with or without hypnosis, and may also be artificially created by suggestion.

* It should be noted that in true contrasuggestion this rejection is no more a voluntary action than is the acceptance of a successful suggestion. Conscious processes of thought may have a great deal to do with the subsequent acceptance or rejection of a suggestion, but the processes themselves are automatic.

† A skilful orator who wishes to make suggestions to his audience which will be unacceptable to them, does not do so at the beginning of his speech, or he would rouse the attitude of contrasuggestion. He begins by telling his audience things they already know and already agree with (or at least are ready to receive), then, after he has got them into an attitude of enthusiastic acceptance, he is able to communicate less welcome suggestions without rousing their hostility.

Individual differences in suggestibility may be partly inborn differences. They also appear to be partly results of differences in training. The habit of receiving and reacting to suggestion appears to increase suggestibility. This is one of the objections to the curing of hysterical symptoms by suggestion, particularly to curing them by suggestions received in the hypnotic state. Symptoms may be successfully removed by a method which increases the high suggestibility that is the root cause of the illness. Training in prompt obedience, that is in the prompt translation into the appropriate action of a received command, is a training in responding to suggestion. Its effect appears to be to heighten suggestibility, thus making the person trained more completely a unit in an organised group and less of a separate individual. It has been pointed out by Rivers that this is the effect of military drill and is indeed its object, since the most effective fighting force is one which acts most completely as a unitary group in response to the commands of its officers²³¹. Since military drill produces high suggestibility amongst those subjected to its influence (the private soldiers) these are prone to the typical disorder of high suggestibility—hysteria. The condition known during the war as shell-shock, in which there was commonly a disability such as paralysis, deafness, or blindness, without organic cause, was simply hysteria produced under the conditions of warfare. Rivers noticed during the First World War that this disorder was found only amongst the private soldiers, while those whose part in the military system was the giving of orders (officers and NCOs) might develop anxiety conditions under the stress of warfare but not the symptoms of hysteria.

How far education should be directed towards increasing suggestibility is a fundamental practical problem of the social psychology of our times. If strong group unity achieved at the price of individual separateness is desired, the road to it is the heightening of suggestibility by military drill and similar methods of education. The valuation of this end is, of course, different in different national groups and in different circumstances. In all countries it tends to be the accepted social ideal in time of war. Whether this is a proper social ideal for all times is a question on which the ruling groups of different nations are sharply divided.

3. Sympathy and Imitation

Suggestion in the restricted sense in which the word has been used above, for communication of an attitude towards a system of ideas, is only one aspect of the process of mutual interchange by which members of a group pursue common ends. A herd of cattle

showing simultaneous flight or aggressiveness acts as a unified group no less than a crowd of men showing fear or anger. Whereas the simultaneity of the crowd of men may be the result of mutually induced opinions which have been expressed in words, the reactions of the cattle are due only to mutually induced courses of action or emotional conditions.

Suggestion as above described may be simply the verbalised form of a more general tendency of mutual induction. In restricting the name *suggestion* to this induction of ideas, we are following the use of McDougall,¹⁷⁵ who uses *sympathy* for the induction of emotions and *imitation* for the induction of courses of behaviour. As a generic term to include all three types of reaction, I suggest the term *social induction*.

Sympathy is unquestionably the source of much socialised behaviour. The effectiveness of a social group, whether of men or animals, depends largely on the distress of one member leading to sympathetic pain and relief of the distress on the part of others, and the anger of one member producing anger in others. We have already seen that emotions thus communicated from a group commonly lead to action of a more whole-hearted and uncontrolled kind than that springing from the individual's self-originated emotions.

Imitation is a reaction for which the stimulus is the perception of another's similar reaction. Plainly it is not easy to be certain whether a particular piece of social behaviour is due to imitation in this sense or to sympathetic induction of emotion. In the one case a specific piece of behaviour sets in action a similar behaviour reaction, in the other it is the general line of behaviour that is communicated. When flight is communicated through a flock of sheep it is impossible to know whether the running reaction of some sheep sets off the running reaction of others (imitation) or the fear response of some sheep starts a fear reaction in others (sympathy). Some writers, such as Tarde²⁶³ and LeBon¹⁶³, have made imitation a central principle in the explanation of human behaviour, but they have used the term so widely as to include all that we have called *social induction*. They have also probably much exaggerated the role of social induction. Important though this is, there are other social behaviour tendencies than the tendency to be moulded by the thoughts, feelings, and activities, of our social environment.

There was at one time an opinion in comparative psychology that the tendency to imitate was the only innate disposition of the young animal, and that all the uniformities in conduct of members of the same species was due to their imitation of other animals of

their own kind. This hypothesis has, however, been conclusively disproved by experiments in which the young of various animals have been brought up in isolation from their own kind. The results of these experiments show that, without any doubt, instincts are inherited, and that only a small part of the uniformity in the behaviour of the animals of any one species is to be attributed to imitation. In the restricted sense in which we are here using the word *imitation*, it is probably not a very important factor in human behaviour, although it certainly plays a part in the process of habit formation in children.

4 Specific Social Behaviour Tendencies

Social ends are served by many of the tendencies which have already been discussed. Acquisitive and aggressive behaviour may, for example, appear as social reactions, as when the bursar of an institution is acquisitive on behalf of that institution, or the aggressive behaviour of a soldier is directed towards the ends of the nation he is serving. There are also behaviour tendencies which are entirely social in their ends. Five of these are distinguished by F. C. Bartlett¹⁷ (1) the tendency of *primitive comradeship* (a relationship between equals), (2) the tendency of *assertiveness* (or dominance), (3) the tendency of *submissiveness* (the last two are both relationships between superiors and inferiors), (4) the social tendency to *conservation*, (5) a social *constructive* tendency.

The tendency to crowd together, to feel dissatisfaction at isolation and satisfaction in being one of a herd, is to be found amongst gregarious animals as well as in mankind. An isolated chimpanzee seems like something less than a whole animal¹⁵³. Galton has described how an individual of a herd of Damara oxen "cannot endure even a momentary severance from his herd. If he be separated from it by strategy or force, he exhibits every sign of mental agony; he strives with all his might to get back again, and when he succeeds he plunges into its middle to bathe his whole body with the comfort of closest companionship"¹⁰². This is a description of the tendency of *primitive comradeship* on a low level of instinctive behaviour. The same tendency may be seen in the relationship between human beings. Social comradeship in its purest form can only subsist amongst groups of persons, none of whom are dominant and none submissive. The club is characteristically a social organisation designed to preserve primitive comradeship amongst a group of people.

Assertiveness and submissiveness may conveniently be treated together. There is a tendency which will very quickly be observed in any human social group for some members to push themselves

to the fore while others voluntarily submit themselves to their dominance

Galton noticed this dual relationship also amongst Damara oxen¹⁰. While most of these animals show an incapacity to rely on themselves and a faith in others, and are willingly led by any one of their number who has enough self-reliance to accept that position a certain number of them show a peculiar amount of self-reliance. These are noticed by the men who bring them in because they graze apart from, or ahead of, the others. They are broken in as fore-oxen and their lead is willingly followed by the others. We have already seen a similar acceptance of submission amongst the cows of Thion,²⁰ but in this case the leader was not allowed to retain that position merely by the possession of a tendency to dominate, but had to fight for it.

Although *dominance-submissiveness* is usually accepted as a bipolar trait in any list of the personality traits, there are certain difficulties in its application to personality measurement. It may be, for example, that an individual who is dominant in one social situation may be submissive in others. Thus a man may be dominating in relation to his family group while he is conspicuously submissive in the office where he earns his living in a subordinate position. Common experience suggests that the extremely dominant individual in some social situation may be more likely to be found extremely submissive in others. This suggests that the more fundamental personality difference is that between the individual who fits readily in a hierarchical social organisation, being readily submissive to his superiors and dominating to his inferiors, and the one who tends to show behaviour of the primitive comradeship type, neither dominating nor submissive, in a wide variety of social situations.

If the tendency to domination is retained as a personality trait for the individual showing dominating behaviour in the majority of social situations, or who shows dominating behaviour in a fluid social situation in which he is free to show either domination or submission, this tendency to dominate must not be mistaken for the quality of leadership. Effective leadership depends on many qualities of personality of which readiness to take charge of a group activity when that is necessary is one. On the other hand, tests of leadership employed by the War Office Selection Boards during the Second World War tended to reject the individual who was merely dominant^{11,2}. Willingness to co-operate, to accept other people's plans when they are better than one's own, ability to suggest a good plan and only to press it on the group when it really is better than what the others are trying to do, these are all qualities

in which the highly dominant individual is liable to be deficient, and they are essential constituents of effective leadership

A situation of everyday life in which qualities of leadership are required is that of chairmanship of a committee. A committee is a temporary leaedered social group with the purpose of making decisions which shall result in some sort of action. It most perfectly fulfils its function if its decisions are genuine group decisions in which all members have taken part. The chairman has many functions: to keep the discussion relevant, to check the influence of over-dominant members of the committee, to interpret the general opinion of the committee when discussion has reached a stage at which this is possible, to decide whether agreement can be reached or whether a question must be put to the vote, and so on. It is not, however, his function to make the decisions of the committee or to attempt to influence them except on very rare occasions when he perceives that without his influence the committee will come to a wrong decision. The dominating type of chairman who tries always to impose his own decisions on the committee is a bad chairman because he lacks the essential quality of leadership, the ability to help the group towards co-operative activity, intervening if and only if his intervention is required for effective group action.

The *tendency to conservation* is the tendency to prefer the familiar in one's social surroundings to the unfamiliar. It may be seen at work in the strong sentiments which are built up round existing institutions and which cause opposition to their change. It is to this tendency that institutions often owe their survival beyond the time when they serve useful social purposes. It is seen at work in the sorrow and indignation felt by many people at such changes of familiar institutions as would be involved in the abolition of the monarchy, or of the House of Lords, or in a change in the structure of the Book of Common Prayer. Of course, the people who oppose such changes do so partly because they believe that the institutions threatened serve a useful social function.

This attitude of opposition to changes in social institutions may be called *conservatism* *. It is one which tends to grow stronger with age, and Rivers has pointed out that the element in a tribal organisation which stands for conservation is its old men.²³²

Social constructiveness is the tendency to make new social organisations. In every social group we can observe this tendency to bring together various social elements in new institutions.

* This attitude is not, of course, to be identified with political conservatism, although no doubt much of the emotional strength of political conservatism is supplied by it. It may, however, also be strong in those who are not political conservatives.

We find it at work amongst the undergraduates in a university who form amongst themselves various clubs and societies which, having no strong tradition which can promote sentiments of loyalty leading to social conservation, do not generally very long survive their founders. From a study of the formation of new religious sects, one is led to the view that the social constructive tendencies are particularly strong in the persons described as group leaders, and that new social organisations generally tend to be built around them. The tendency to social constructiveness is generally, although not necessarily, found to be in conflict with the tendency to social conservation. In fact, the conservation tendency seems to oppose the formation of new social institutions as well as trying to conserve old ones.

CHAPTER XVII

SOCIAL GROUPING

1. Social Groups

In a large herd of animals, it is found that there exist smaller groupings of animals that tend to keep together. In the same way, in human societies there are smaller bodies of men or women or both who are bound together by kinship, by a common set of political beliefs, by a similar occupation, by common tastes in sports, or simply by friendship. Within each of these bodies there is more of the attitude of primitive comradeship than between members of different groups, and a certain tendency to exclude from the body and to adopt a relatively hostile attitude towards those who are not members. All such bodies may be called *groups*. We may define a group as a more or less segregated body of people. The term segregation we have already met in our discussion of perception,* its use in social psychology is the same. A segregated part of the visual field is one which, while belonging to the total visual field, also possesses a certain unity of its own by which it is, as it were, separated from the rest of the field and ceases to be merely a part of it. So also a social group possesses a unity of its own which separates it from the larger group to which its members also belong.

Modern civilised society is a complex system of interrelated social groupings. An individual is a member of many groups with very different and often intersecting boundaries. He is a member of his own town or village. He is also a member of a large family group with vague outlines probably extending over many districts, and of the smaller more segregated family group of himself, his wife, and his children. He is also a member of a church or a political organisation, either or both of which may be institutions with boundaries extending beyond his own nation. Much of his behaviour is determined by the fact that he is a member of a particular social class, although social taboos may prevent him from being as conscious of this social grouping as of the others. He may also be a member of an occupational institution, such as a trade union or an international society of microscopists or sociologists. This too may have boundaries extending beyond the limits of his own nation. He may feel more similarity and enter

* See p 196

more readily into the relationship of primitive comradeship with a Japanese member of his own international occupational group than he does with a member of his own nation who belongs to a different social class

The social groupings so far referred to are more or less permanent. They may or may not involve actual physical contiguity of their members. All members of a church congregation may at certain times be under one roof together, forming during that time a *contiguous group*. A man is unlikely to have ever been under one roof with all or most of the other members of his social class. The lack of contiguity in this case does not, however, mean that his group membership of his social class is any less a real factor in the determination of his behaviour. Other groupings are essentially transitory. On his way back from work a man may form one of a crowd and his behaviour, for the moment, may be largely determined by this membership. There has been an unfortunate tendency in social psychology to concentrate attention on crowds as the typical group and to treat crowd psychology as if it were the whole of group psychology¹⁶³. The crowd is, however, a very special kind of group characterised by its transitoriness and the physical contiguity of its members. It is by no means representative of the kind of group, such as a nation, a social class, an occupational group, or a church, which is more or less permanent and in which group membership does not necessarily depend on even occasional physical contiguity.

There are many factors determining the amount of unity which exists between the members of a social group and the amount of separateness between them and individuals outside the group. First there is the factor of difference or resemblance. On the whole, we tend to form social groupings with those who are like ourselves, in speech, in manners, in skin colour, in dress, etc. As the resemblance becomes less, so also does the tendency to form social groupings. A black man and a white man may be drawn together by the possession of common interests, but the external difference between them renders this drawing together very much less probable than if both were white or both were black. Let us call these differences which determine social groupings *group distinguishing marks*. On the whole, the formation of social groups takes place between those with similar group distinguishing marks while segregation will tend to take place between groups whose members have different group distinguishing marks.

Other factors which determine the formation and the degree of segregation of social groups are the extent to which their members think of themselves as a social unit (their *group awareness*), the

extent of their common interests, sentiments that they may have formed towards the group or its leader, or the fact that the group has been organised for the pursuit of some practical aim with which they are ready to identify themselves

A social group may be more or less internally cohesive and more or less segregated from the other parts of the larger group of which it forms part. These two characters of internal cohesiveness and external segregation are very generally in direct proportion to one another, although probably not always. McIver¹⁸⁰ uses the word *association* for a group organised for the pursuit of some common interest, and *community* for the more strongly knit kind of group occupying a single geographical area and bound together by their common life. Unfortunately, other writers have used these terms with other meanings (*e.g.* Alverdes¹¹) although still with the implication that an association is a less segregated and cohesive group than a community. It is probably impossible to have agreement as to the use of such terms for social groups, and there is no point in discussing the purely verbal question of whether a community is this or that kind of social group. When precision in group nomenclature is required it is better to specify what is meant by using adjectives describing such qualities of the group as its cohesiveness, the permeability of its boundaries, its permanence or transitoriness, the degree and kind of its organisation, and so on. Thus a crowd is a transitory contiguous group, unorganised, with completely permeable boundaries, spontaneously formed as a result of some common interest, a committee is a semi-permanent contiguous group with a leader, organised to attain some practical end.

2. Group Activity and the "Group Mind"

There are certain respects in which a social group shows activities which are closely analogous to those of an individual mind. We are inclined to speak of a committee as having formed an opinion or as having decided on a certain course of action, or even, after it has deliberated, we may say that the committee has "made up its mind". The preceding process of deliberation has obvious resemblances to the deliberation by which an individual makes up his mind. Various courses of action are suggested, arguments for and against these courses are considered, and in the end perhaps a common agreement is reached. As a result of the decision an action is taken which resembles the volitional act of an individual.

Some writers would hesitate to use such expressions as "group opinion" or "group decision" because they feel that these terms

imply an assertion of a kind of thought or decision which is not reducible to the thought and volitions of individuals as modified by their mutual interactions as members of a social group. This use of language need not, however, have any such implications. When we use the term "social group" we are not implying the existence of any super-individual entity other than the individuals composing it as modified by their mutual interactions. The term is a valuable one in social psychological theory because the mutual interactions of group members makes the group something more than the mere sum of its members. In the same way, the mutual interactions of thoughts, feelings, and volitions of different group members produces a new element into group activity which it is convenient to refer to as the thought, feelings, and volitions of the group.

Can we, then, also speak of a "group mind"? This is a subject on which there has been much controversy between social psychologists and sociologists, although it is mainly a verbal question depending on the use of the word "mind". McDougall defended the concept of the group mind in his *Social Psychology*, saying "We may fairly define mind as an organised system of mental and purposive forces, and, in the sense so defined, every highly organised human society may properly be said to possess a collective mind"¹⁷⁵ It is to be noted that this use of the word "mind" does not imply the existence of a collective supra-personal consciousness belonging to a group. Those, like McIver, who have disputed McDougall's use of this concept have assumed that the use of the word "mind" for a group did imply a supra-personal consciousness.¹⁸⁰ The word is certainly inclined to have this implication for the reader. The *Concise Oxford Dictionary* defines "mind" as "seat of consciousness, thought, volition, and feeling". Few people would dispute the proposition that a social group displays an organised system of purposive forces, but it is probably better to avoid the use of such a term as "group mind" to express this fact.

Even if one accepted McDougall's definition of "mind", one might still have hesitation in accepting his statement that such a group mind is characteristic of every highly organised human society. If we want examples of group thought or decision, we turn not to nations or other societies but to contiguous social groups such as committees, which have been organised for the purpose of forming opinions and making decisions. Such functions are effectively performed only by groups with certain characteristics. They have, for example, fairly narrow limits of size, and a group of twenty or more individuals generally proves a very ineffective means of coming to decisions or expressing opinions. Temporary

spatial contiguity, or some substitute for it, is also necessary, if members of the group do not all come into the same room, they must at least be in close touch with each other by letter-writing or telephoning. A considerable measure of homogeneity is necessary and a certain willingness to co-operate. International committees trying to arrange international affairs are generally entirely ineffective for this purpose because lack of homogeneity and unwillingness to co-operate make impossible that mutual interaction which is an essential characteristic of effective mental action in a group. In such committees, too, the members are often divided by language, by mutual hostilities, and by conflicting interests, instead of mutual interaction of opinions, each section has its mind made up from the beginning and the final vote does not reveal a joint decision but merely discovers how many of the individuals have from the beginning embraced different sectional interests.

When we talk of a large group such as a nation having an opinion, or having come to a decision, we may be attributing to it a degree of mental activity which is impossible to such a group. When a war situation develops we are inclined to say of the enemy nation "Cambodia is plotting war". This is to attribute to a nation a level of mental activity of which it is not capable. The truth may be that a particular individual in control of Gambodian policy is plotting war. Or it may be that a small group of individuals who are the governing group of Cambodia, or who are planning to become so, are plotting war. Or a much larger group, such as a political party, may have formed the intention of going to war. The nation as a whole may go along a course determined for it by a single individual, by a small ruling group, or by a much larger group, but it is very rarely true that the nation as a whole has determined such a course of action. Some of its members are likely to approve of the decisions of the individual or group determining its policy, some may oppose that policy, some will passively acquiesce in it. "Cambodia is plotting war" is generally a picturesque piece of misrepresentation serving the ends of propaganda but not properly describing any social psychological fact.

That a course of action towards which a nation or other group is moving may be the result of the deliberate decision of an individual or group of individuals is not, however, the only possibility. There may be forces within a country driving it towards a war or other end-result which is not desired by its people or intended by any group of them. There may be group tensions within Cambodia which are leading it in the direction of a war towards which none of its inhabitants are guiding it by their deliberate intention.

although some may welcome it. Such a situation will be misrepresented if it is treated as the carrying out of the intention of some individual or group or of the nation as a whole.

In the same way, it would be a misrepresentation of the social psychological facts to regard the reorganisation of English social life which resulted from the Industrial Revolution as consciously aimed at by the industrialists by whose activities it was very largely produced. They were concerned to make profits for themselves by building factories and utilising the sources of power. One of the results of the activities of this period was the increased power of the middle classes, but to say that the middle classes were pursuing the aim of achieving economic power would be to suggest a deliberately chosen aim for a process which was almost entirely planless. The industrialists each pursued their own private aims and their rise to power was not an end consciously accepted either by the industrialists as individuals or by any group of industrialists. It was a mere resultant which was neither planned nor foreseen.

A system of social tensions tending towards a previously unforeseen end may, of course, at any stage be understood and directed by an individual or by a group of individuals. There may be no conscious direction of social tension in the early stages of a revolutionary outbreak. But the successful outcome of a revolution may be the result of the liberated social forces having been directed to ends deliberately chosen by revolutionary leaders. The dissatisfaction of an oppressed people may have supplied the energy behind the Russian Revolution, but the new social structure of the U.S.S.R. was the result of a plan deliberately chosen by Lenin and the other Bolshevik leaders.

The fact of group activity being directed towards an end must not therefore be taken necessarily as evidence that this is an end chosen and deliberately pursued by the group. This may indeed be the case, but generally only if the group is small or contiguous or both, *e.g.* a committee or a crowd. The second case is where the end of group activity is chosen by an individual or by a sub-group in control of the activity of the group. The third case is when there has been no choice by an individual or by a sub-group or by the group as a whole, but the end is one towards which the group is travelling blindly and purposelessly, directed only by stresses within itself. In this case the group can be no more supposed to have decided its end than a river can be said to have decided to flood.

3. Group Awareness

The internal cohesiveness of a social group and its effectiveness in its interactions with other social groups depend partly on the

extent to which members of the group are aware of the existence of the group and of their own membership of it. This may be called the degree of their *group awareness*. Thus individuals can have varying degrees of awareness of their membership of a particular race (whether real or fictitious from the point of view of an anthropologist), of a particular nation, or of a particular social class. These may be called their degree of race awareness, of national awareness, and of class awareness, respectively.

The concept of group awareness as a factor in group effectiveness has become generally familiar through the work of Karl Marx, who considered that the necessary condition for the attainment of working-class dominance was that members of the working classes should become *class conscious*.¹⁸⁷ This term "class consciousness" is in this sense exactly equivalent to our use of "class awareness". The objection to its use in social psychology is that "group consciousness" has been used in the sense of a suprapersonal centre of consciousness belonging to a social group, and the use of the term in a different sense is liable to lead to confusion.

Group awareness is not to be regarded as a purely psychical fact, it has also a behaviour aspect, and from this aspect it may be described as the verbalising of the group relationship. From the side of behaviour, the evidence of group awareness in the members of a group is to be found in their referring to themselves by a name indicating membership of the group, such as "Englishman", "Nordic", "Presbyterian", "worker", etc., in their tendency to extend the behaviour of primitive comradeship to other members of the group in preference to those who are not members, and in their tendency to adopt standards of behaviour (of manners, speaking, eating, dressing, etc.) characteristic of the group.

The absence of group awareness may be the determining factor in preventing a group from taking co-operative action. The blue-eyed people of Great Britain, for example, are not group aware. If it were desired to make them take violent action against the brown-eyed, it would be necessary first to give them a distinctive name, and to make them think of themselves as members of this blue-eyed group and identified with its interests rather than as members of the British people as a whole.

It was reported by travellers (I do not know how truly) that, early in the nineteenth century before the beginnings of their revolt against the Turkish rule, the people occupying the country we now call "Bulgaria" had very commonly no name which they gave themselves as a distinct people. If this was so, the first condition for a successful rising was that they should think of themselves as Bulgarians, *i.e.* that they should become race conscious.

Similarly Marx, when trying to prepare for a proletarian revolution, rightly considered that it was necessary that the working classes should become "class conscious", that they should think of themselves as forming a separate class from the rest of the community, with interests that were peculiar to them. Governments that do not want a proletarian revolution aim at the reduction of class awareness and the intensifying of national awareness. Those whose aim is to prevent national wars similarly see a danger in national awareness and would rather intensify awareness of membership of larger units so that, for example, an individual would think of himself as a European rather than as an Englishman or German.

4. Group Loyalties

Group awareness is a way of thinking about a social group, group loyalty is a way of feeling about it. The mere fact that a man is aware of his membership of a particular social group (that he is group conscious) will not in itself make much difference to his behaviour. Its importance lies in the fact that then and only then can he have a sentiment or other attitude towards the group. His sentiment about a group to which he belongs may make a very great difference to his behaviour.

Loyalty is a particular kind of sentiment (or attitude) of an individual for a social group of which he is a member, one which leads him to continued co-operative effort with the group. Since every individual is a member of more than one social organisation, he has a complicated system of loyalties which sometimes conflict with one another. He has, for example, his loyalty to his cricket club, to his church, to his business, to his own town, and to his nation.

An intense loyalty to one group does not necessarily cause hostility to another group, nor does it necessarily involve decreased loyalty to a large group of which the group in question is a constituent part, although both results may follow. A Manchester man's loyalty to Manchester does not prevent him from co-operating with a Liverpool man in the defence of England when there is a war. In fact, it is usual in an army to encourage group feelings about the smaller units—regiments, companies, and even platoons—because it is believed that the general tendency to form loyalties will result in an increased loyalty to the larger organisation of the army as a whole. This is what is called inculcating *esprit de corps*.

On the other hand, hostility towards certain other groups may contribute much to cohesion within the group. Probably there is no force that unites men more strongly than a common hate, and those who wish to bind together the members of a group in a strong sentiment of loyalty may do so most easily by finding a group enemy.

for the members of their own group to hate. There is probably always some tendency for hostility to develop between segregated groups. This tendency may be increased by the external facts that the groups are competing for the same ends, or by deliberate increase of group hostility as a means of producing unification within the group.

The sentiments of loyalty for nations, *i.e.* sentiments of *patriotism*, commonly include, as part of their system, hostility towards other national groups. Loyalty to the smaller group of the nation does not therefore commonly lead to loyalty to any larger groups of which the nation is part. When, as at the outbreak of a war, hostile attitudes against other national groups are strengthened, there is a noticeable increase in the patriotic sentiment. There may therefore be real incompatibility between patriotism and any wider allegiance. For this reason the inculcation of international sentiments for groups transgressing national boundaries is commonly discouraged by strongly nationalistic rulers.

We are now at a stage of social development when the group loyalty which we are inclined to value most highly is that to our country, and, on the whole, other loyalties are subordinated to and organised within the sentiment of patriotism. But there seems neither psychologically nor sociologically a reason why the State should be regarded as the final point to which loyalty can extend. *Internationalism*, or the feeling for a community of men wider than the limits of one's own individual State, is a development beyond nationalism corresponding to the step from feudalism to nationalism. Social and economic developments are making the interdependence of nations more important than their rivalries.

There is no psychological barrier to the formation of the kind of loyalty that is required by internationalism. Already we have in the Christian churches, in the British Empire, and in international socialism, social organisations wider than national boundaries, which call out from their members loyalties which transgress the limits of the State. The passage from exclusive patriotism to a patriotism subordinated to and organised within an international sentiment is an essential step in our mental development which must be taken if we are to avoid the destruction which may be brought to our civilised way of life by the continuance of national rivalries and the wars to which they lead.

5. Social Institutions

One of the ways in which a social group increases its internal cohesiveness and secures its permanence is by giving itself a formulated organisation. This organisation is a social institution.

Thus a number of men may meet casually at a restaurant drawn together by a common interest in art or in socialism. They are already, to a considerable extent, a group and not an unorganised aggregate, because their aggregation has a social purpose, that of discussing the subject of their common interest. After a time, it is suggested that they should form themselves into a club with a secretary, a constitution, and definite times of meeting. This club may continue as an entity long after its original members are all dead. It is a social institution.

Social groupings which are not institutionalised may also be strongly segregated and permanent. Membership of the middle classes is as definite a fact in a man's social life as is his membership of the Methodist Church, although his social class has no president or secretary, no constitution, and no rules of membership.

Perhaps the main psychological difference between social groups based on institutions and those that are not institutionalised is that the possibility of the absence of group consciousness is peculiar to non-institutionalised social groups. A man may or may not have a sentiment of loyalty for an institutionalised group to which he belongs, but he cannot fail to be aware of his membership of it.

6. Group Structure

In a social group there may or may not be an individual who occupies the position of group leader. This difference in structure may also be observed in animal grouping. A group that is leaderless may nevertheless be unified and closely organised, but, for certain practical purposes, the leaedered group is the more effective unit. If the function of the group is to oppose another group (the function of armies, trades unions, federations of employers, etc.) or to accomplish effects in the outside world (the function of a workshop) or merely to come to a joint decision, as in a committee, the condition for effectiveness in action appears to be some sort of organisation with a leader or (as in an army) with a leader and a hierarchy of subordinate leaders.

It has been observed amongst groups of children playing or engaged in any other co-operative activity that some readily adopt the position of group leader and are accepted in this position by the remainder of the group. A certain amount of study has been given to the necessary characteristics of the group leader. It has been suggested that any individual characteristic favourably regarded by the group will tend to give its possessor the position of group leader by differentiating the individual in question from the remainder.¹⁵² It has been observed that the leader amongst children is commonly of greater intelligence than the average of

the group, but that too great a difference is unfavourable to leadership.³⁷ Observation of the leaders of adult groups seems to suggest that the undeviating behaviour of the individual with strong perseverative tendencies helps to make others follow him and that the unchanging convictions even of the paranoid individual may have the same effect. As has already been pointed out, however, those peculiarities of personality which make an individual crave for domination over others do not necessarily make him an effective leader. A considerable measure of co-operativeness and sensitivity to the feelings and opinions of the group must be combined with independence to make the really successful group leader.

In many cases, as on a committee, the position of leader may be held only temporarily, while the end of the group is in the process of attainment. Sometimes the relationship between leader and led, or the more complex relationship of a hierarchy of leaders, is maintained permanently, and in this fact we probably have part of the origin of social stratification into superior and inferior social classes. The germ of the superior-inferior relationship is perhaps to be found in the family. The same kind of organisation may be supposed to have been carried over into such early groupings as those intended to secure the ends of religion and of warfare. It is certain that for warfare, and it was supposed that for dealings with the gods, a permanent superior-inferior organisation was the most efficient. A committee may work as efficiently at its next meeting if a fresh member is in the chair, but an army with the relationship between commanders and those under command reversed would be an inefficient fighting organisation. Furthermore, some are more fitted for the position of leadership than others, either through superior intelligence or some other quality of character valuable to a leader, so that, even with no permanent superior-inferior social organisations, these would tend always to be in the dominating position in every new social group.

Various other factors tend to make this relationship permanent. The superior group may, for example, be of different race and of different colour, as was true to some extent of the Indian castes. Hereditary titles and hereditary wealth make it possible for some families always to remain in superior positions in social groups. Differences in speech and custom similarly tend to make these divisions permanent. It is obvious that while the ability to act as leader is to a certain extent innate, so that the hereditary qualifications for leadership may be based on sound biological principles, inheritance may also place artificially many men in the position of group leader who have no real capacity for this position.

7. Social Classes and Social Stratification

The most conspicuous social segregation that exists in human society is that between members of different nations. These have well-marked group-distinguishing marks, differences of language, of manners, and sometimes of skin colour, while intercourse between them is made difficult not only by these differences but also by the obstacles to travel, some of which are natural while others are imposed by human regulations.

There is segregation hardly less extensive between different social classes within the same country. These, too, are separated by lesser speech differences and differences in manners which make social intercourse difficult. Sometimes there may even be differences in race and skin colour. Since different social classes in the same area very commonly differ in customs, manners, speech, and in other respects, it is not scientifically correct to speak of the prevalent behaviour of a particular area when the object of study is a civilised society. It is also necessary to indicate to what social class within that area the observations refer.

These differences between different social classes form group-distinguishing marks which help to form classes into more or less segregated groups. The segregation is incomplete since class boundaries are indefinite. The indefiniteness of boundary, however, does not make the differences between social classes any the less a real one. In most European countries the differences between different social classes are mostly acquired and not inherited differences; they are the result of the development of different attitudes, habit systems, etc., formed by a different social tradition and a different economic tradition. This is not universally true, since in many countries different racial strains are found in different social strata as a result of a conquering race reducing the conquered aboriginal inhabitants to an inferior class engaged in manual labour while the conquerors themselves form the military and priestly classes. Even when the differences between social classes are entirely acquired, however, they may be in many respects more far-reaching than the differences between individuals of another country but of the same social class.

One of the most important features of class differences is that they are commonly accompanied by a difference in social valuation which we shall call *social stratification*. This means that certain social classes are generally regarded as *superior* to others.* Social

* The words "superior" and "inferior" as applied to social classes are used in a severely technical sense to mean relationships within a scale of social stratification. Stratification is a fact of social structuration which we can recognise by various marks, perhaps most easily by noticing that the member

stratification does not merely imply that members of some classes esteem themselves as socially superior to others but also that this difference and the obligations it entails are accepted by the others

Social classes exist wherever people differing in occupation, in racial origin, etc., form more or less segregated groups within the same area. Social stratification exists when such segregated classes have also a superior-inferior relationship to each other. Division into social classes and their gradation into social strata may be definite and institutionalised as in the caste system of India, or indefinite as amongst ourselves. The word "caste" is probably best reserved for a definite and institutionalised system of social stratification.

General recognition of the problems connected with social classes and particularly those of social stratification are rendered difficult in our own society by the existence of a strong social taboo on verbal recognition of the fact of social stratification. Reference to the existence of superior and inferior social classes would generally be recognised as an unpardonable error in taste. A member of the upper classes who insisted on non-reciprocal obligations of manners from his gardener and who in all other respects behaved to him as to a member of a different and inferior social class would be shocked at a verbal formulation of this difference.

The tendency to segregation between different social classes is partly maintained by the existence of such group-distinguishing marks as differences in the details of speech, of manners, and of customs. Food habits, for example, form a group distinction between different classes and different social strata. In the Trobriand Islands those of noble rank are prohibited from eating certain foods, such as bush pig, and feel that such food is disgusting.¹⁸⁷ The outcastes of India eat birds of prey, which seem disgusting to Hindus of higher caste. Members of the higher social classes in our own country do not generally eat shrimps, winkles, or bloaters, while those of lower social strata usually do not eat and do not like caviare or venison.

Class-distinguishing marks tend to vary at different times and even to become reversed in their indications as a result of a tendency of members of inferior social classes to adopt the

of a superior social class gives orders to one of inferior social class while the other obeys them, and that there is a social obligation on the member of the inferior social class to use gestures or methods of address indicating respect which the other is not under the same obligation to reciprocate. Many of the differences are external signs of a relatively intangible but very real difference in social prestige attached to different classes. The use of the term "superior" in this connection does not imply that the member of a socially superior class is superior in intelligence, social usefulness, or in any other respect except that of occupying a higher position in a stratified social system.

characteristics of superior social classes. This tendency is frequently rationalised by reference to the manners of speech and the social customs of superior social classes as the "correct" ones.

The basis of class differences in a society may be differences in occupation, in race, or in wealth. It may also be any combination of these. The matter may be further complicated by a man's social position being partly inherited, so that it is partly determined by the occupation, race, or wealth, of his ancestors. The importance of the inherited factor is, of course, increased by the inheritance of titles, since these serve to form group-distinguishing marks of those whose claim to social prestige rests on their ancestors, whereas, in the absence of these marks, the social position of their ancestors would be forgotten or, at least, unverifiable.

The most important occupational difference is that between the governing and governed classes. Originally the upper classes meant the governing classes. Since the functions of government were handed down from father to son, and the group difference of the upper classes was reinforced by titles of distinction, they tended to form a highly segregated group, a tendency which is now less strong, since, in the relatively democratic organisation of our nation at the present time, many of those who actually perform the function of government are not descended from members of this class, while others who do belong to this class by descent play no part in government. Also the titles of rank which served as group-distinguishing marks have often been given to those who are neither themselves members of the governing class nor descended from members of the governing class. Instead of a sharply segregated social class, therefore, the upper class is one with a segregated nucleus, and fringes which are not sharply divided from other classes.

The remainder of social stratification is determined by two main principles: the inferiority of the seller in the buyer-seller relationship, and the much greater social inferiority of manual labour. The first principle determines the line which is drawn between those who are "in trade" and the professional classes—lawyers, accountants, etc. The second determines the line between all black-coated workers and members of the "working classes". Other factors may serve to make these lines less distinct than they would be if these principles alone determined them. Great wealth, for example, makes it possible for its possessor to adopt the habits of living of an occupational class higher in the scale of social stratification than his own.

In many ways the most important line in the system of social stratification is that drawn between those who do and those who

do not engage in manual labour. It is seen most clearly in countries where there is a difference in race between the superior and inferior social classes, with a tendency for all manual work to be done by members of the inferior race. Those members of the superior race who engage in manual labour lose much of the prestige attached to their membership of the superior race. Although somewhat less clearly defined in racially homogeneous communities, this line of social stratification remains a fundamental one. When Marx wished to indicate the difference between social classes, he made a division into two classes only, the *bourgeoisie* or privileged class above this line and below it the *proletariat* or unprivileged class.¹⁸⁷

The social importance of the line of cleavage between the working classes and the middle classes depends, of course, largely on economic factors, on the fact, for example, that the worker has to sell his labour for wages in conditions more unfavourable to him and at a much lower price than does the average member of the middle classes (although not necessarily under worse conditions than the most lowly-paid members of the middle classes).

What has been said above refers to the class system as it exists in Great Britain. In the U.S.A. the situation is somewhat different although this difference is not correctly expressed by saying that there are no class differences in the U.S.A. The distinctions between occupational groups are less marked and there are fewer non-reciprocal social obligations of address. An American chauffeur will address his employer in much the same way as the employer addresses him. It is mainly this absence of non-reciprocal obligations of address which is meant by the statement that Americans are more "democratic" than Europeans in their social contacts.

Occupational differences are less indicative of differences on the social scale because they are less permanent, and less accompanied by recognisable group-distinguishing marks. Whereas in Europe it is usual for a man to continue in one type of occupation during his life and for that occupation to belong to the same social level as that of his father, it is possible in America for the son of a professor to be working as a bricklayer, although possibly at the same time he is preparing himself to become a professor or a business executive. At the same time, such group-distinguishing marks as manner of speech and dress are not as great between the bricklayer and his employer as they would be in Europe.

There seems, however, to be a clear consciousness of class superiority of those holding executive positions in any occupation. This dividing line corresponds to that between the middle classes

and the working classes in Europe, although perhaps not drawn in quite the same position

So far as one can judge from American fiction and occasional controversies in American papers, there are, in some parts of the U S A , superior social classes which are to some extent segregated and endogamous. Membership of these classes seems to depend less on the exercise of governing functions than in Great Britain. There is probably less tendency for members of other classes to imitate the characteristic marks of superior social groups in behaviour and speech.

The fundamental class divisions in the U S A are those based on racial distinctions. Particularly strong is that between those of pure white blood and those known to have any negro ancestors. Less strongly marked is the division between those of North European ancestry and those of South European origin. The group awareness of those of the superior racial classes is reinforced by the derisive terms "nigger" and "wop". Such a class distinction as that between white and black is, of course, made easier by the existence of clear group-distinguishing marks such as skin colour, straight and curly hair, etc. The class distinction between whites and negroes is partly an occupational one, since negroes find it difficult or impossible to find employment of high occupational status.

Class differences and social stratification thus exists in the U S A as in Europe. In many respects they are less marked, but in others they are deeper. There are, for example, no differences in Europe so great that the superior class would not worship in the same churches as the inferior class.

8. Codes of Manners

The adjustment to one another of members of a social group is facilitated by customary forms of speech and action, such as those of greeting, farewell, etc. These differ from one social group to another, both in their form and in their total quantity. They may be called *social obligations*, and the whole system of social obligations of any group may be called its *manners*. Manners differ not only in different areas but also in different social classes in the same area. In many countries of Europe it is customary for men meeting to kiss each other on both cheeks, under circumstances in which in Great Britain or the United States they would shake hands. In Arab countries, they would touch their breast and forehead after shaking hands, and would go through a complicated formula of greeting.

There are similar differences of manners between different social classes in the same area. Removal of the hat is, for example, a

commoner social obligation amongst the leisured classes in Great Britain than amongst the working classes. There is, however, no general rule that social obligations are greater in amount or more rigid in higher social strata. In Central Europe the peasants observe far more social obligations than do the middle classes, such as greetings on meeting strangers and good wishes before eating. This is probably due to the fact that such social obligations are declining and that this process is less advanced among the more conservative peasants.

The total quantity of such social obligations is less in some groups than in others. In Spain and Morocco, for example, the correct things to say and do in various social situations are prescribed in greater detail and observed with greater rigidity than in the relatively less-mannered countries of Great Britain and Northern Europe. To say that one country has fewer manners than another is not, of course, to say that its members show less courtesy than those of the other, although this also may be true. It is a requirement of courtesy to observe the code of manners of the social group in which one is mixing, but it is equally a requirement of courtesy to avoid those manners which are not customary to the group.

It would be a matter of considerable interest to social psychology if some research investigator would give an accurate comparative account of the social obligations observed in different social classes within our own country as an anthropologist would do for a primitive society. This has, so far as I know, never been done. A beginning of such studies is to be found in the book of "etiquette". This is an account of the social obligations observed by the upper social stratum with the unscientific suggestion, based on the tendency to imitate superior social strata, that this is the "right" system of social obligations for everyone.

The possession of a code of manners facilitates social intercourse and the adoption of the attitude of primitive comradeship within the group. It may also serve to increase the separateness of the group from other groups. One of the difficulties which prevents an individual from establishing the relationship of primitive comradeship with a group of different nationality or of a different social class is the fact that he has a different code of manners. Manners may thus form a group-distinguishing mark.

They may also serve to mark the relationship of superior and inferior in different social strata. Between equals the social obligations of manners are reciprocal—an obligation of behaviour or speech of *A* towards *B* is equally an obligation of *B* towards *A*. Other social obligations, however, are non-reciprocal. *A* is required

to adopt a certain form of behaviour or speech towards *B*, who is socially superior, although this obligation does not exist or exists in a different form from *B* to *A*

Non-reciprocal social obligations are to be found both in speech (the use of titles of respect) and in forms of behaviour. Malinowski reports that in the Trobriand Islands, a man passing a social superior must adopt a crouching attitude, the social superior also has the obligation to rise if he is sitting down so that the man passing him may be lower than he is¹⁸. Similarly, a social superior in our own country expects to be addressed as "Sir" or "Madam" by a social inferior, but does not reciprocate this form of address. In some cases also the hat is raised by a social inferior while the social superior responds with an attenuated salute. When both parties in a social rite perform a similar action, it may be given a non-reciprocal character by the obligation of the social inferior to perform the action first. Thus the army salute is a non-reciprocal social obligation, the private soldier "salutes" an officer, while the officer "returns his salute"

9 The Stability of Social Organisations

Social stratification is a fundamental character of our pattern of culture. It very largely determines the set of motives that we have earlier distinguished as those of transformed aggression in the form of social competition. The social prestige attached to a higher position in the scale of social stratification is part of the reward of the successfully competitive individual. This system of motivation has its disadvantages, both individual and social. We have already discussed the disadvantages to the individual who suffers from failure to attain his object in the competitive system. The social disadvantages of the system is its tendency to result in social instability.

A permanently stratified social organisation may also be a stable one. Neither the economic disabilities of the lower social strata nor the low social esteem that they enjoy is in itself a cause of social instability. It is probable that an organisation in which serf labour is employed is very generally more stable than one in which there is a class of free workers receiving wages. More generally we may say that a stratified organisation of society will attain its greatest stability if members of all strata have the attitudes and sentiments which fit them into their place in the scheme of stratification and have no motives driving them to try to alter their position in the system (*e.g.* if membership of a certain stratum is inherited and cannot be altered by the efforts of the individual), and if they are not conscious either of group membership of a

depressed class or of any avoidable hardship or injustice in their economic position

Thus the typical employee of a titled landlord feels respect for his employer without either envy or hatred. He does not wish to occupy the position of landlord himself, for such an aim is too remote from possibility to be a reasonable goal of his effort. He is not conscious of himself as a member of a class with interests opposed to those of his employer's class. Rather his group awareness takes the form of awareness of himself as a member of the small stratified group of his employer and the other employees on the estate. He does not feel his relative poverty as an injustice for he considers it as an inevitable part of an established order of things whose rightness he has not been taught to question.

Very different is the typical manual worker of the city. He is likely to have little personal contact with his employer, with whom his relationship may last only for a short time. The conditions are thus not favourable for the development of sentiments towards his employer which would keep him contented with his relatively inferior position. Frequent changes of employment may make it difficult for him to have group awareness with respect to the firm with which he works, whereas the fact that he lives in a locality entirely surrounded by those of his own social class and that he finds political and other organisations to strengthen his sense of class membership all tend to develop his class awareness. In addition he may have become acquainted with a system of ideas which have suggested to him that neither his economic hardships nor his low social prestige are inevitable. He may have learned to feel that he is the victim of a system by which the fruits of his labour are very largely diverted to the support of members of a privileged superior class and that this system is maintained by the determination of members of this superior class to defend their class interests. Here we have the social and psychological conditions for the development of class hatred and of social instability through class conflict.

One way of restoring social stability that has been proposed is the Socialist solution of the *classless society* (or, in our terminology, the *unstratified society*) by elimination of the stratification of society into privileged classes and unprivileged inferior classes by creating effective equality of income and of social esteem for different occupational groups. It is an obvious fact of social psychology that we have moved a considerable way in the direction of reduction of stratification in Great Britain since the beginning of the present century.

Karl Marx taught that the motive force for such a change could only be supplied by the intensification of class awareness amongst members of inferior social strata, and of attitudes of hostility amongst them towards other social classes¹⁸⁷. This road to social stability has obvious dangers, since civil war between classes may be destructive in itself and may not lead to the desired condition of stability but rather to a new condition of instability through the dominance of a new ruling class. Whether there is another road to an unstratified social system cannot be determined by argument but by experience, and the experience of social changes since Marx wrote does not seem to confirm his prediction of a necessary increase of instability in a stratified society.

It is also possible that, with a stratified pattern of culture under a democratic system of government, the standard of living amongst the lowest strata may rise to a sufficient extent to make their economic grievances no longer an effective spur to revolutionary action. With a rising standard of living, their social prestige would probably also rise. Both of these factors have operated to produce in the United States of America a condition of considerable social stability and a lessening of the tensions between classes. Although the attainment of social stability is still far from complete, there can be no certainty that progress in that direction is not also a possible road to the reduction of social stratification to a level at which it is not a dangerous threat to the stability of the nation.

10. Group Dynamics and the Reduction of Group Tensions

The effectiveness of social activities is reduced in various ways by the existence of tensions within and between social groups. Examples of the effects of such tensions are to be found in hostilities between different racial groups, between different social classes, industrial disputes, and wars. Social psychology can render no greater practical service to humanity than by devising means to reduce such tensions. A certain amount of work has been done in connection with racial hostilities and industrial friction.

Let us suppose that we have any group such as a workshop which has been organised for the practical end of producing some article. A great part of the motivation of the members of the group will be directed towards that end, and, so far as that is the case, the group will be an efficient producing unit. On the other hand, part of their motivation will be either indifferent to the aims of the group or in opposition to those aims, such as the aim of the workers to secure maximum monetary reward for minimum work. Industrial conflict may arise where these motivational systems

come into opposition with one another. Some of the factors producing conflict may be a genuine conflict of interest between different sub-groups, such as the question of the proportion of profits that go to workers' wages, to managerial salaries, and to shareholders' dividends. Other factors producing conflict may be more psychological than economic, such as conditions of work producing frustration, exasperation produced by fatigue or discomfort, jealousies and loss of self-esteem, lack of knowledge of the ends of the process of production, and so on. Many of these latter causes of conflict may be not clearly recognised by the individuals on whom they act, thus rendering the group situation analogous to that of the psychoneurotic individual whose disorders of behaviour are due to unconscious systems of motivation. The cure of the group situation may also be analogous to the psychoanalytic treatment of the individual. If members of the group can be got together under the chairmanship of a psychologist and encouraged to express all these sources of tension which are normally unexpressed, it may become possible for the group situation to be changed in such a way as to reduce these causes of conflict to a minimum and to make it an efficiently functioning group. An example of such remedial action in a badly functioning group is given by Lewin in an article on "The Solution of a Chronic Conflict in Industry"¹⁶⁷

It is important to bear in mind that the presence of irrational factors in a group conflict does not make that conflict any less real. Industrial conflicts are often dismissed as results of the unreasonableness of the workers, who are stated to be earning as good wages as the industry can afford. That may, in some cases, be true. The social psychological problem remains as to why workers earning as much wages as the industry can afford nevertheless go on strike. There is something in the group situation which leads to strikes in that industry. To obtain industrial peace it is as necessary to understand and to remove the irrational causes of conflict as it is to deal with the real diversities of interest.

This is also true of the international tension situations which lead to war. There may be genuine differences of interest between two nations, as when one wants territories or markets which are also wanted by the other. At the same time it may be apparent to both sides that the result of a war, even to the winning side, may be an economic loss far greater than the territorial gain that is hoped for. Yet there may be systems of international tensions which will produce a war which neither side desires and from which neither side hopes to profit. International organisations such as the United Nations Organisation might help to resolve these

international group tensions by a system of free discussions such as those used in industrial disputes. Differences of points of view and language have generally proved too great for the effective use of these means of resolving international tensions, but it is to be hoped that an effective system of international social psychological therapy will be evolved in the future.

CHAPTER XVIII

MORALITY AND CRIME

1. The Psychological Sources of Moral Behaviour

Everyone agrees in regarding some lines of conduct as *good* and others as *bad*, and, on the whole, social approval is bestowed on the person who carries out *good* conduct and disapproval on those whose conduct is *bad*. About the question of exactly what behaviour is good and what bad, different societies and different individuals have had different opinions, but all societies and individuals agree in the distinction itself.

The term *moral sentiments* has been commonly used for those sentiments or attitudes towards particular kinds of conduct which lead to the moral approval of some kinds of behaviour and moral disapproval of others. It is clear that these moral sentiments are not the only sentiments from which moral behaviour can spring. Care for our parents, for example, may spring from the sentiment of love for them and not from the sentiment of approval for filial behaviour. Nothing but confusion could result from applying the term moral sentiment to every sentiment which leads to behaviour of moral value, for every sentiment in some situations probably does lead to moral behaviour. If, on the other hand, we use moral sentiment in the more restricted sense, we must recognise that the moral sentiments are not the only roots of moral behaviour.*

McDougall regarded the organisation of moral conduct within the self-regarding sentiment as the highest form of morality, and considered that a moral character is impossible to one lacking a strongly developed self-regarding sentiment. He said, for example, "to lose the respect of others is only the first step on this path of disintegration of character. So long as a man still believes in himself and is capable of shame and of resenting an insult, his case is not hopeless. But, as soon as the man says 'I'm a rotter' and does not care who knows it, he is beyond the power of human aid"¹⁷⁶

This theory seems to be altogether inadequate. No doubt some people find their motive for moral conduct in the reduced self-esteem they would feel if they transgressed their own moral

* Kant's teaching on morality amounted to the ascription of moral value only to conduct which proceeded from the moral sentiments. Against this view most men would agree with Schiller that it is better to care for our parents because we love them than because we believe it to be a virtuous course of action.

principles. The statement that this is the highest type of character, however, seems to have no better foundation than a personal preference. To many it would seem to be a highly undesirable type of character formation. The saints of Christianity and of many other religions have often regarded a destruction of the self-regarding sentiment as complete as that of McDougall's "beachcomber of the magic isles of the Pacific" as an essential step in the formation of the highest type of character.

There is no doubt that primitively moral behaviour is behaviour of which there is social approval, and that the development of the moral sentiments in the individual results from his acceptance when he is a child of the point of view of the grown-up people who tell him that this line of conduct is good but that is naughty. Finally he feels the same emotions of approval and disapproval towards certain lines of conduct as other people, he becomes part of the social unit which approves or disapproves.

The process by which social requirements originally enforced by parents become accepted as one's own judgments of right and wrong is called by the psychoanalysts the process of *introjection*. It must be remembered that the system of moral judgments resulting from this process is applied not only to other people but to the individual himself. He condemns certain lines of conduct in himself and if he carries out such lines of conduct he has a sense of *guilt*. Moral delinquency is sometimes found to be associated with a deficiency of guilt feelings about conduct which is wrong or criminal, although this is by no means universal. It is more general that those who offend against current social requirements make much the same judgments as to right and wrong as do other people. It is also found that some neurotic and psychotic individuals show guilt feeling which is not attached to morally wrong behaviour. We then speak of a pathological sense of guilt. Such misapplication of guilt feelings is, of course, no more morally serviceable than the opposite characteristic of not feeling guilt about really wrong behaviour. The satisfactorily developed personality is that in which there is a sense of guilt about wrong behaviour which is a force acting against wrongdoing but in which there is no diffused sense of guilt about morally indifferent activities. The term *super-Ego* has been used for the introjected system of parental prohibitions which is the hypothetical source of pathological guilt.

If we recognise that moral standards are socially determined and differ within different patterns of culture, it does not follow that there is no sense in asking whether a particular system of standards is a good or a bad one. Activities considered as right by any society are those which conform to the approved behaviour systems

of its own pattern of culture and which secure its socially approved ends. But the approved pattern of one society may reasonably be judged better than those of another, and the ends pursued by one may be morally preferable to those pursued by another. It is obvious that in making such a judgment we are liable to be influenced by the particular pattern of culture in which we have been brought up. This means that such a question is difficult to answer in an unbiased fashion, not that it is one that cannot sensibly be asked.

2. Moral Responsibility

One of the necessary conditions for making moral judgments about behaviour is that we regard the person carrying it out as *responsible* for that behaviour. We express moral disapproval of a person who has killed another only if he has not done it accidentally or in a state of automatism. In these different attitudes towards different kinds of behaviour and different conditions of the same behaviour lies the meaning of the word *responsibility*.

Moral approval or disapproval is felt for a man's acts when he is responsible for them. It would probably be a more correct psychological account of this distinction if we said that what we mean by a man being *responsible* for his acts is that we morally approve or disapprove of them. The condition under which we ascribe responsibility is that the act has been carried out voluntarily by the man performing it, and with the conscious intention of attaining the end he has attained.

When we call an action "voluntary" we mean either that it is a volitional action or that, if it is an impulsive action, it could have been inhibited by volitional effort. This is essentially the criterion adopted for the legal conception of criminal responsibility. By the McNaghten rules (given by the law lords after the McNaghten murder of 1843, in which a defence of insanity was successfully made), a person is not held legally responsible for a crime if he was suffering from such a defect of reason, from disease of the mind, as not to know the quality of the act he was doing, or if he did know it, he did not know that the act was wrong. Thus a person of very low I.Q. is not held to be legally responsible if his defect of intelligence is so great that he cannot be regarded as understanding the nature of his act or the difference between right and wrong, nor can an insane person be held legally responsible if his insanity leads to a similar failure in understanding. On the other hand, he does not escape legal responsibility by the plea that he is acting under irresistible impulse (that is, under an impulse too strong for volitional control). It has sometimes been argued by

psychiatrists that a paranoiac may commit murder knowing his action to be wrong and to be directed by the intention to kill, but under an impulse too strong to be controlled. It may be true that there are such impulses, although it would obviously be very difficult to determine that this was so in a particular case. It is also possible that a criminal action may be carried out automatically but in response to an unconscious wish. If a person in a state of automatism commits a crime, he is not held to be responsible, yet that crime, let us say murder, may be the result of an unconscious wish to kill the murdered person. Moreover, it is possible that punishment may be to some extent effective as a deterrent even from actions for which the person committing them cannot be held fully responsible.

These are difficulties in the rational justification of the ascription of responsibility and of the practical application of this idea in legal punishment. They suggest that there is no sharp line (as popularly supposed) between responsible and irresponsible behaviour, but a continuous gradation between them. But the conception of responsibility as an account of social attitudes is in no way altered by these observations. It is a fact that moral disapproval and approval are felt in connection with some courses of action and not with others. Although reflection makes less clear the demarcation between actions for which approval and disapproval are felt, most people do not reflect sufficiently to cause any lack of sharpness in the outlines of social moral judgment. An increased general knowledge of psychopathology would probably alter the line of demarcation between the actions for which a man was held responsible and those for which he was not. Such a change has, of course, taken place within historical times. Maniacs were at one time treated like criminals, and no doubt people felt the same kind of social disapproval of madness as they did of crime. Now we feel the same kind of disapproval of madness as we do of bodily disease. A change has taken place here in the position of the line drawn between responsibility and irresponsibility.

An objection is often made to modern psychological methods of treating delinquency that they ignore the reality of moral responsibility by treating moral offences as psychological symptoms of which it is desirable to cure the offender but for which he must not be blamed or punished. Defenders of psychological treatment of criminals do sometimes write as if this were the assumption on which their defence of the psychological method is based. It is not, however, necessary for the believer in psychological methods of treatment to take such an extreme position. The causation of crime is complex. A man committing a crime of violence may

do so partly because the make-up of his personality predisposes him to anger and aggression, partly because, through defects in parental and other educational influence, his attitude towards violence is less strongly condemnatory than that of the ideal citizen in our own pattern of culture, partly because knowing violence to be wrong, he has voluntarily chosen in this matter to do wrong rather than right. The first and second of these causal factors can be dealt with by psychological treatment, the third alone deserves moral condemnation. In some cases causation of the first and second type is the main reason for the offence, in some cases they may be relatively minor factors. Where they are major factors in the situation, psychological treatment is likely to be profitable whereas punishment may be wholly ineffective. There may be danger in encouraging the offender himself to consider that his offences are psychologically caused, so that by this idea he is discouraged from moral effort, but ineffectiveness in dealing with delinquency can also result from respectable people allowing their moral indignation at the crime to blind themselves to the possibility that it may be psychologically caused and psychologically curable. The attitude of the mature personality towards offences should be that of condemning one's own offences as moral lapses to be corrected by volitional effort, while remaining ready to consider the non-moral psychological causation of the offences of others.

3. The Psychological Problems of Crime

Every pattern of culture has, as we have said, approved patterns of conduct for its members. Breaches of these approved patterns arouse social disapproval. Certain of the breaches are socially punished, others are checked merely by the pressure of public opinion. It is those breaches that are punished that belong to the class of *crimes*.

There is no single problem of crime. The speculations of the Italian criminologist Lombroso that criminals belonged to an inferior human type with recognisable physical marks of degeneracy has now been generally rejected as without scientific foundations. Nor is there any ground for supposing that criminals in any other way form a constitutionally different class from other people. Certainly a criminal may have a character peculiarity which differentiates him from the average person of his community even before he commits a crime, he may, for example, be a sadist who commits murder because the sight of blood flowing gives him sensual pleasure, or he may commit sexual offences because he is sexually perverted. These are examples of *criminal deviants* as distinct from the class of so-called *normal criminals* which includes, for

example, the individual of normal personality with normal responses to social influences who has been brought up in criminal surroundings and has learned burglary as a trade by the same sort of social influences as make other men teachers or policemen

It has been pointed out that criminal deviation is a function of the pattern of culture to which an individual belongs⁴⁰ A temperament which is normal in one pattern of culture may be a deviation which is dangerous to the community in another * The temperamentally violent man, for example, might have been an approved character type in the Middle Ages, the successful business man who is the approved type of our pattern of culture would be regarded as a potential criminal in the U S S R The problem of a society with respect to its deviants is to extend social toleration as widely as possible to harmless deviations like homosexuality, to treat dangerous abnormalities by psychotherapeutic methods in psychological clinics, and to provide harmless outlets for the energies which cannot be used in the existing pattern of culture (boxing, for example, for the violent) Possibly preventative detention will always be necessary for some types of temperamental deviants

More commonly the criminal has a temperament not deviating appreciably from that normal in his social surroundings Acted on by the same incentives as other people, he may have committed an offence because his circumstances made an incentive to a crime so strong that most other people would have committed the same crime in the same circumstances Temptations to theft are, for example, strong amongst the poor There is a high correlation between poverty and delinquency⁴¹ In particular cases wise treatment may reduce the incentive of temptation Thus, when children steal money in order to go to the pictures, it is sometimes found that the trouble disappears if they are given a regular allowance of pocket money The social solution of a great part of this sort of crime would be to abolish poverty It may not be beyond the wit of statesmen of the future to accomplish this Crime would then be much reduced, but it would not disappear

The person of normal character may also be led into crime by social influences A boy may have criminal parents If he is to be saved from a life of crime, it is desirable that he should be

* A man, for example, who served with success in the war of 1914, being decorated for bravery, was later serving a sentence of penal servitude for a crime of violence A mutiny broke out, and he received a free pardon for his courageous defence of the warders against the mutineers Less than a year later, he was sentenced again to a term of penal servitude for a crime of violence His temperament made him a well adapted member of society during a time of war and of mutiny, but unfitted him for life in a peaceful society

removed from their influence. He may be playing with a gang of boys in the streets who, as they grow up, are being led into more dangerous illegal behaviour. This may be dealt with by removing the boy or sometimes the leader of the gang, to another neighbourhood.

The original causes of crime may also be in large measure, unconscious. A repressed hostility to the father, for example, may be the origin of a hostile attitude towards all authority which expresses itself in criminal acts. When this is a principal cause of the criminal acts of a juvenile delinquent, punishment may be a very ineffective method of dealing with the delinquent since this intensifies the hostility which is the root cause of the offences. The first step in the treatment of all unconsciously motivated crime must be the use of some method akin to psychoanalysis by which the unconscious system of motivation becomes conscious and is therefore brought under voluntary control.

4. The Psychology of Punishment

The most obvious method for a society to use in dealing with offences against its code of behaviour is the method of punishment. Punishment has more than one purpose. First, there is the intention that the unpleasure attached to punishment shall cause the offender to avoid the offences which produce it. This is generally known as the *reformative* aim of punishment. That punishment will succeed in this aim is an expectation based on the principle of stamping out lines of behaviour leading to unpleasure which is the negative aspect of the Law of Effect. A rat can be taught to avoid one exit from a box and always to use the other if it is given an electric shock every time it attempts the wrong exit. Cannot punishment equally well teach a criminal to avoid criminal action?

Unfortunately there are important respects in which the two cases are not parallel. The rat is given an electric shock every time it goes to the wrong exit, whereas the most efficient system of legal punishment does not succeed in punishing the offender more than a small fraction of the number of times an offence is committed. It is doubtful whether a rat would learn if it occasionally received a shock at the exit to be avoided but much more often was allowed to pass through unshocked. If, moreover, those times when the rat received the shock were associated with some other variable feature of the situation, and a shock were given at the wrong exit when that other variable feature was present and not when it was absent, then it is fairly certain that if the rat learned anything it would be to avoid that variable feature with which punishment was invariably associated and not the wrong exit with which it was only occasionally associated. It is not otherwise with the

criminal who is punished on those occasions when he is caught. The psychological situation is one calculated to teach him to avoid being caught rather than to avoid the offence. Furthermore, the rat's motivation is not complicated by factors driving him towards the wrong exit which may be reinforced by punishment, whereas the hostility of the criminal towards legal authority may be strongly reinforced by punishment, which may thus make him more prone to commit offences.

The psychological situation with respect to punishment prepares us to find that it is not a very effective reformatory influence. This is proved by the large number of offenders who become habitual criminals. There is no reason for supposing that it is never reformatory, and the first-offender whose motivation is relatively uncomplicated by unconsciously determined emotional factors may be warned off crime by the experience of punishment, particularly if the punishment followed his first commission of the offence and was not of a nature to cause a sense of degradation or a lasting hostility against the authority inflicting the punishment. On the whole, however, this is not the case, and in a large number of cases the first sentence is only the first step in a life of crime. If punishment were intended solely as a means of reforming those to whom it is applied, it might well be abandoned as an ineffective method.

Reformation of the individual punished is not, however, the sole purpose of punishment, it is also intended as a *deterrent*. That is, it is intended to deter from prohibited activity those who would carry it out if they did not fear punishment. It is less easy to determine how effective punishment is in its deterrent aspect since we have no simple way of discovering, for example, how many people would commit such crimes as violence or theft if they did not fear punishment. It is generally assumed, and probably rightly, that the orderliness of a peaceful society is to a considerable extent dependent on the threat of a system of punishments for the offender. Unfortunately the requirements of an effective deterrent and an effective reformatory influence are in conflict with one another. If, for example, we wish to reform the offender, it is better not to punish him but to give him psychological treatment under conditions in which he is made as comfortable as possible and with the minimum restriction of his freedom. It is found by psychologists working with criminals that remedial treatment cannot be successfully applied to the criminal who is suffering a prison sentence.⁷⁵ But the conditions favourable to psychological treatment are not those best calculated to deter the potential criminal.

At the present time it is generally recognised, at any rate by those dealing with juvenile delinquents, that the first question that

must be asked is what is best for the convicted child. The social psychologist has, however, no right to demand that this should be the only question considered. The delinquent youth whose rebellion against authority takes the form of equipping himself with a club and knocking old women on the head in order to secure their handbags, would stand the best chance of reform if he were sent to the type of approved school in which he would be given comfort, liberty, unconditional love, and psychological treatment. But the old women have also the right to be protected, and the threat of harsher treatment for their assailant would be more likely to deter other adolescent youths from committing the same kind of offence. It is necessary that there should be a balance between the requirements of the offender and the requirements of other members of the society in which he lives, and the most that the psychologist can ask is that the best shall be done for the offender that is consistent with a reasonable degree of protection for other people.

The problem of punishment would be easier to consider in a rational manner if there were not a third kind of motivation behind the infliction of punishment, which may be called the *vindictive* aim of punishment. This is the least rational of the reasons for inflicting punishment, but it has probably far more influence than is generally recognised. It is based on infantile motives, on the feeling that if punishment follows crime there is a restoration of a balance that has been upset. It is felt that the criminal "ought" to suffer.* This motive is reinforced by the repressed protosadism of infancy, and in some cases by a fully developed sadism of adult life. The strength of this motive is sometimes obscured by its rationalisation as an appeal for a deterrent punishment. There is often no conflict between this and the deterrent motive since both may be satisfied by severe and even savage punishment†. The conflict arises between both of these motives and the motive of reform because a punishment which is calculated to deter other criminals and which satisfies the vindictiveness of the non-criminal is generally very unfavourable to reform of the individual punished.

* There was, for example, a letter in the local newspaper on the day on which this paragraph was written advocating flogging for members of street gangs. It ended "Such hooligans are worse than murderers, and should be punished accordingly. If they are allowed to escape with their lives it should be only after a vigorous application of the 'cat'". This is what is meant by the *vindictive* motive for punishment. The appeal is that the gangsters "should be punished", not that such punishment would reform them or deter others.

† Although, as Bentham pointed out, certain punishment is a more effective deterrent than severe punishment. Vindictiveness is often inclined to sacrifice certainty for severity.

This vindictive attitude may be an element in the attitude towards punishment of the offender himself. He also feels that a balance has been upset by his offence and that the balance is restored by his punishment. Punishment may help to get rid of an uneasy feeling of guilt, replacing it by the sense that a debt from him to society has been paid, or perhaps overpaid, by the punishment and that he can now offend again. It is sometimes advisable not to indulge the offender's craving for punishment, since, instead of acting as a barrier to crime, it may be part of a chain reaction which consists of an offence, a punishment which he regards as society's retaliation for that offence, another offence which is his own retaliation against society for the punishment, and so on. It may be necessary to break the chain by refusing to punish and leaving the offender with the discomfort of a sense of a debt unpaid. Aichorn reports that a critical point in breaking down the resistance of the juvenile offender to the love offered him by the psychotherapist is to refuse to punish when he expects to be punished, and even at this point to make him a gift.¹

5. Psychological Treatment of Delinquency

Whatever may have been the reason for a man's first steps in crime, criminal courses will in later life be likely to have become a habit system at least as difficult to change as the set of habits connected with any other occupation. Actually the difficulty is greater, since the fact that he is known to be a criminal and to have suffered a prison sentence makes it more difficult for him to obtain a non-criminal occupation. It is therefore much easier to reform a criminal when he is young, and the interest of the clinical psychologist is mainly centred on the juvenile delinquent.

At the present time it is generally, but not universally, recognised by those dealing with juvenile delinquents that the first question that must be asked is what is best for the convicted child. He may be sent to an institution (a Borstal institution or an approved school) which has as its object the training of him as a law-abiding citizen. In some of the more modern approved schools the character of the detention as a punishment may be reduced to a minimum, while the primary object is psychological treatment. He may, alternatively, be placed on probation, in which case he is left free with such supervision as makes it easier for him to lead an orderly life, with the possibility of treatment at a psychological clinic or the joining of some youth organisation which will enable him to adjust himself to the ordinarily accepted social values.

Most modern psychological methods of treating delinquency are based on psychoanalysis. They regard the aim as that of

readjustment of the personality so that the delinquent may accept the realities of social life. One of the pioneers in this method of treatment was August Aichorn, who started an institution for delinquent boys in Austria in 1917.¹ His method depends on the emotional attachment of the delinquent to the therapist providing the incentive to discovering the repressed motives of the delinquent behaviour and to providing adequate motivation for a new adjustment towards the ends of society. It is generally agreed that an unsatisfactory adjustment towards the parents is a principal factor in producing delinquency.²⁰¹ Broken homes, quarrelsome parents, an unmarried mother, or the death of one parent, all provide unfavourable conditions for normal social development. The unconscious motivation of the delinquent may be the desire to attract the attention of the mother who has shown too little affection for him in childhood or an indirect way of revenging himself on either or both parents who have alienated the child by harshness. Aichorn's basic principle is that the therapist must supply the place of the unsatisfactory parent, giving the delinquent child unfailing friendliness and unconditional love while still letting the delinquent know that this friendliness comes from strength and not from weakness.

A somewhat different attitude towards the treatment of delinquency was implied by the methods of Homer Lane, who regarded development of an attitude of hostility against authority as the principal source of juvenile delinquency.¹²³ He believed that this hostility was first aroused by parents who insisted on obedience, and that it was later transferred to the policeman and to the whole system of legal authority. His solution was to give the convicted juvenile delinquent the responsibility of sharing in the government of a free and self-governing reformatory. The inmate of the reformatory shared in the exercise of the authority which ruled it, so that it was impossible for him to be a rebel against that authority. Children who had been violent and rebellious became peaceful and co-operative members of Homer Lane's "Little Commonwealth".

Methods of treatment of adult criminals by psychological methods have also been explored by the *Institute for the Scientific Study of Delinquency*.⁷⁵ Sufficient success has been reported by the psychoanalysis of criminals to give reasonable grounds for hope that such treatment may hold out the best hope for reform of the habitual criminal. It is obvious that, at best, it can only scratch the surface of the problem, since the length of time taken by each treatment would make it impossible except in very few cases. Methods of group analysis in which many delinquents of a similar type discuss their problems in groups under the guidance of a

psychotherapist has also been used and success has been reported ²⁴⁸ This holds out better hope of becoming a practicable method of applying psychological methods of treatment to large numbers

It still remains true that most delinquents, both young and old, are on conviction sentenced to terms of confinement in which nothing positive is done towards the readjustment of their personalities This has the effect amongst the older ones of consolidating criminal habits Amongst the juveniles a much larger proportion profit from a period of ordered life under conditions removing them from the homes in which commonly their most acute emotional problems are found A considerable proportion, however, show a return of delinquent habits when they go back to the complexities of social life We are still far from the point at which the treatment of the offender is that best suited for enabling him to develop a normal personality

CHAPTER XIX

THE PSYCHOLOGY OF ECONOMIC VALUE

1. Desire and Economic Value

An object of economic value is one which arouses desire, at least in some people, so that they are willing to give effort or to exchange other things they already possess for it. The behaviour they adopt towards such an object may be called a *positive* or *seeking reaction*. Similarly, negative values (i.e. *disutilities*) are attributed to objects towards which avoiding reactions are adopted.

Desire is an affective condition of unrest which directs behaviour towards the attainment of some end. It differs from the emotions in the fact that it is prospective in its direction—i.e. its feeling refers to something which is to be attained in the future and not to something in the present situation.

The normal condition in which desire arises is that an impulse in some direction is not satisfied, because the impulse is directed to some object not immediately attainable, as a result of some external obstacle or for some other reason. When this situation causes unrest, accompanied by a more or less clear knowledge of the condition under which that unrest could be removed, we have desire. The biological function of desire is to reinforce and to make more persistent the seeking reaction of the obstructed impulse. When we experience desire, our mental unrest, and consequently our seeking behaviour, becomes greater when the representation of the desired object recurs to our thought.

The process of exchange can be expressed very roughly by describing it as an interchange between individuals of those articles which they desire less strongly for those they desire more strongly. Demand and price are economic facts which are rooted in the psychological facts of the strength of people's desires for different articles.

The value of an article for a particular individual is measurable by the amount of effort that he is willing to make to attain the desired object, or, indirectly, by the number of other values that he is willing to give in exchange for it. Such a value of a particular object for a particular individual may be called an *individual* or a *personal value*. The price at which an article can be sold obviously depends in some way on the intensity of the personal

valuation of it by potential buyers, although it would be oversimplifying the situation to say that it is a measure of those personal values

Psychologists have used the term *valence*, as an English equivalent of Lewin's *ausserforderungscharacter*¹⁶⁶ for the characteristic of the behavioural object which is the result of our desires. This *valence* or *demand character* has the same meaning as the economists' *personal value*. Its use avoids the ambiguity resulting from the use of "value" both in this sense and also in the more metaphysical sense of the character of objects which makes them proper objects of desire.

While desire can be the result of the thwarting of any impulse we are mainly interested in desires springing up from behaviour tendencies which can be satisfied by the attainment of some commodity. To such tendencies we may give the name of *wants*. We must then say, not that value is attached to an object when a desire for it is unsatisfied, but that when a want is unsatisfied we both attach a personal value to its object and we desire it.

This is the sense in which the word "want" is generally used in economics, for the permanent disposition postulated to account for the occurrence of a particular set of desires in an individual from time to time. In ordinary speech, the word "want" is also used for a transitory condition leading to the demand for something at a particular moment. Thus we might say that a man looking for his tobacco pouch in order to fill his pipe does so because he wants tobacco. This is plainly a different use of the word "want" from that in which his want of tobacco is the fact that he will always desire it and try to obtain it when his supply of it runs short. We shall restrict the use of the word "want" to the second of these two senses.

A want is thus a disposition and not an experience. We are aware of the existence of a want either by the recurrence of experiences of desire from time to time under conditions of deprivation or by the observation that under such conditions of deprivation persistent efforts are made to obtain the object for which there is a want.

2. The Possibility of Quantitative Statements about Desires, Wants, etc.

The terms we use in any theoretical science may have any of three relationships to the concept of quantity. Some of them stand for things which have intensive differences which can be given an exact numerical form. People's incomes or the number of heads of cattle that they possess clearly belong to this class. There

are also differences which, although they are differences of intensity, cannot be measured exactly. Two emotions of anger felt by the same person at different times, or a man's social position, belong to this group. Of two objects of this class we may say that one is greater or less than another, but the question of how much greater is meaningless. Lastly, things may have only differences of quality which are not differences of intensity or quantity at all. The differences between the primary colours belong to this last class.

We can produce muddles in our account of the psychology of economic behaviour if we fail to understand to which of these classes a particular term belongs. We must not talk of unmeasurable intensive differences as if they were measurable, or of differences which are not intensive as if they were.

First of all, we may consider the case of desires. When we make quantitative statements about desires, *i.e.* when we use the words "greater" and "less" in comparing desires, our meaning is perfectly clear so long as we are talking of one individual. First of all, he has differences in the intensity of his various desires which he can recognise by the character of his own experience. At a moment when he is desiring more than one thing he can tell us which of these desires are strong and which are weak. Secondly, we can discover by the study of his behaviour that he uses very different amounts of effort to attain the different objects of his desires, and that at any moment he will direct his endeavours towards attaining one object of his desire rather than another.

The really important fact that makes quantitative statements about desires reasonable and useful is the observation that on the whole the introspective arrangement of his desires corresponds to the arrangement we should make by studying his varying amounts of effort and his preferences. That is to say, it is true on the whole that the things for which his desires appear to himself to be the strongest are the things for the attainment of which he puts out most effort, and are the things which he will prefer to attain rather than the objects of his weaker desires. This is true on the whole, although examination of our own desires will quickly convince us that the correspondence is not exact.

This means that we can make quantitative comparisons between desires. Is it also true that we can make numerical statements about desires and say that one desire is a certain amount greater than another? Plainly we cannot do so on any grounds derived from our own experience of desiring. Nothing in the character of our experience at any particular time enables us to say that our desire now for a certain book is let us say, seven times as great as our desire for a loaf of bread.

We can, however, make much more exact quantitative statements about the amount of effort we are willing to make to attain different objects of desire. What is capable of precise arithmetical expression is the *price* that we are willing to pay for the object of our desire. I may at the same time pay 3s 6d for a book and 6d for a loaf of bread. Between these two there is an exact arithmetical relationship, one is seven times as great as the other.

Now it is certainly true that the reason I bought a loaf of bread was because I desired it, and similarly my desire for the book made me buy that. Can we not say that these prices are indirect measures of the strength of the two desires, and that my desire for the book was seven times as great as my desire for the loaf of bread?

The answer is that we might do this if the strength of desire for different articles were the only factor determining the price we paid for them. Quite clearly, however, it is not. Let us suppose that a man is buying a horse at a fair. The reason that he is making efforts and is willing to part with money in order to buy the horse is that he desires it. If we ask him, he will be able to give us a rough idea as to whether his desire for it is weak or whether it is strong, and, other things being equal, we can predict that if his desire is strong he will pay a bigger price for the horse than he would otherwise. But a large number of other factors will influence the price he finally pays. Such factors are, for example, the persuasiveness of the seller, the suggestibility of the buyer, the buyer's dispassionate judgment of the horse's value, and even such remote factors as the state of his health and the influence on his spirits of the weather.

But, it might be argued, we are merely enumerating different factors which influence the strength of the buyer's desire for the horse and so influence indirectly his valuation of it. The persuasiveness of the seller merely makes the buyer desire the horse more strongly, and similarly the buyer's dispassionate judgment of how much the horse is worth increases or decreases his desire for it. In all these cases, it might be supposed that the buyer's desire alone determined the price he was willing to pay for the horse, although this desire might be dependent on many external influences. If this were the case it would remain true that the buyer's valuation of the horse is an indirect measure of his desire for it.

This argument would be perfectly sound if, as a matter of psychological fact, it were always true that these factors only altered the price the buyer was willing to pay for the horse by altering the strength of his desire for it. Certainly they may act in this way, but it is also clear that they may not.

The persuasiveness of the seller, for example, may indeed be directed towards increasing the buyer's desire. He does this by enumerating the good points of the horse, by saying that it is a good bargain, and so on. But it is possible to influence by suggestion a course of action as well as an affective state. The seller's persuasion may take the form of a bullying assertiveness under the influence of which the buyer's desire remains unaltered while the amount of money he parts with is increased.

The more indefinite influence of the buyer's health and spirits may also affect the price he will pay directly and not through their influence on his desire for the horse. A man may, indeed, desire things less strongly because he is ill or depressed, but also he may desire something as strongly as when he is in health, but find himself less inclined to make efforts to attain the desired object.

A purely dispassionate (non-affective) judgment of the animal's value will also quite certainly be a factor in determining the price the buyer will pay. This judgment, also, may lower or raise the price he will pay without affecting his desire. We are none of us willing to pay high prices for things which we desire strongly if we are accustomed to pay much lower prices for them. We may desire a cup of tea very strongly on a walk on a hot day, but if we were offered one at a wayside cottage for five shillings we should be likely to refuse it.

The truth is that the buyer's desire is one factor only in the total situation determining the price he is willing to pay. If all other factors remain equal the price he will pay will vary with the strength of his desire, and we should be perfectly justified in calling the price the indirect measure of his desire. But, as we have seen, all other factors in the total situation may vary independently of the buyer's desire. We could then only make price a measure of desire if we included in "desire" the influence of every factor determining the price. This, however, is to use the word "desire" so widely that it is robbed of all useful significance. In the ordinary sense of the word "desire", strength of desire is one factor and one factor only in the total situation which determines the price a buyer will pay for an article. Desire has intensive qualities, *i.e.* we can make quantitative statements about it, but it is not capable of exact measurement. It is price alone which is exactly measurable, and a price does not even indirectly measure a desire.

A quantitative grading of wants is less easy than a quantitative grading of desires. We can say that one desire is stronger than another both because it may seem stronger in our experience of it and also because we find that we use a greater amount of effort to attain its ends. We cannot make a comparison between different

intensities of wants on the same grounds. It is true that different wants give rise to desires of different intensities, but the intensity of the desire springing from a want does not depend only on the nature of that want but also on the extent to which it is unsatisfied.

An intensive term is, however, commonly used of wants when we speak of their *urgency*. Wants are classified in accordance with their *urgency* into *necessaries*, *comforts*, and *luxuries*. This basis of classification is clearly well founded in actual properties of different classes of commodities or other goods that we may want although it is less clearly related to our behaviour dispositions.

The actual property of wants which underlies this grouping of them into necessaries, comforts, and luxuries, is the varying strength of the desire for their different commodities when the amount an individual possesses is nothing at all. A necessary is an article, such as food, for which the craving will take precedence over cravings for articles of either of the other classes if the individual possesses none of it at all. A comfort is similarly supposed to be preferred to a luxury if the individual making the choice possesses nothing of either.

The case of the individual who possesses nothing of the articles belonging to the classes under consideration is, however, of purely theoretical interest. The classification of wants according to their urgency ceases to have any significance whatever as soon as we turn to the actual conditions under which economic demand is generated. A person living in poverty has desires for articles belonging to the classes of comforts and of luxuries as well as for necessaries, and in fact purchases them long before he has so many necessaries that his desire for these vanishes altogether. If he has a small amount to spend, the particular kinds of article he spends it on will be determined by the amounts of different commodities he already has, and will not be predictable by knowledge of whether the articles in question are necessaries, comforts, or luxuries. The grading of wants according to their "urgency" is therefore without much meaning except for the limiting case of the man who possesses nothing at all.

We cannot then say that an individual's want for one article is in general stronger or weaker than his want for another article. What we can say is that in a given situation (when he possesses given quantities of both) he will prefer one or the other. No quantitative relationships hold between wants in themselves, apart from the amount of the article in question already possessed by the individual. The classification of wants according to their urgency into necessaries, comforts, and luxuries, tells us nothing about the strength of desire for various articles in the practically important

situation in which all wants are to some extent satisfied. We cannot therefore, in general, make quantitative statements about the hypothetical permanent psycho-physical conditions determining the occurrence of particular desires which we have called "wants" but only about those desires themselves.

The only thing in an economic transaction which is both quantitative and measurable is the price at which an exchange takes place. Much confusion arises in economic thinking by the attempt to put into the psychological conditions behind an economic transaction the properties of quantitateness and measurableness which belong only to the external transaction itself.

It is futile to see in price the measurement of desires, since many other factors than the strength of a man's desires for different articles determine the prices he will pay for them. Nor have we any better right to see in preferences an indication that a man expects a greater *amount of satisfaction* from one article than another. *Amounts of satisfaction, measurement of wants*, and a good deal of what is written about *consumer's rent* must be put down as psychological fiction.

Even so careful a thinker as Marshall, while he clearly recognised the immeasurability of many quantitative psychological phenomena said "If we find a man in doubt whether to spend a few pence on a cigar, or a cup of tea, or on riding home instead of walking home then we may follow ordinary usage, and say that he expects from them equal pleasures" (p. 76)^{186a}. If we wish our account of this doubt to be psychologically adequate we must most certainly refuse to follow this usage.

3. The Psychological Determinants of Price

If we admit that wants are not expressible in quantitative terms at all and that desire cannot be expressed in exact quantitative forms, we are faced by the problem of what use we can legitimately make of the conception of *individual valuation*, that is, of the numerical expression of a valence. Writers on economics very commonly speak of an individual valuation as some price at which a person is willing to buy or sell an article, which is perfectly definite and expressible in numerical form, before the transaction takes place. If the individual concerned is a potential buyer of an article, his individual valuation of it is the price above which he will not buy the article and below which he will buy it. If he is a seller, his valuation is the price below which he will not sell and above which he will. An economic transaction is supposed only to take place when the valuation of the buyer of an article is higher than the valuation of the seller.

Thus the valuation is a hypothetical disposition to acquire or retain an article which is expressible in numerical form, and whose conscious concomitant is the buyer's or seller's desire for that article. Our previous discussion should render us suspicious that any such conception is largely a fiction.

As an example of the use made of this conception of the individual valuation, we may take the following account of a case of isolated exchange which is discussed by Smart. "A peasant, *B*, wishes to buy a horse, and his circumstances are such that he puts the same estimate upon £60 as he does on the possession of a horse. His neighbour, *S*, has a horse which he values as worth £20. Here there will certainly be an exchange, as, at a price, say of £40 both make a gain of £20 over the amount at which, in the worst case, they are willing to exchange. But if the exchangers act on the principle 'better a small profit than no exchange' the price may be anything above £20, or under £60, and the actual figure is determined by the 'higgling of the market'. Here, then, the price will lie between a minimum of the seller's subjective valuation and a maximum of the buyer's subjective valuation"²¹⁸

The assumption underlying this passage is that there is a definite quantitative valuation in the mind both of the buyer and of the seller. In other words, it is assumed that the desire of the buyer for the horse and the desire of the seller for the horse can be expressed in an exact quantitative form. We are then left with the difficulty of accounting for the point between the valuation of the seller and the valuation of the buyer at which the exchange actually takes place.

Now it is clearly true that if the buyer could only get the article required at a very high price, he would refuse to buy it. As the price is lowered his refusal becomes less positive, until finally a point is passed at which his refusal changes to a consent, and at a still lower price he will complete the bargain with increasing alacrity.

But is this point at which he is willing to buy dependent only on the previous mental dispositions of the individual concerned? If not, the conception of an exactly measurable individual valuation before the transaction takes place is untenable.

Now it is quite possible that, as a result of deliberation, the buyer (or seller) has determined on a definite figure above (or below) which he will not go. Examination of our own minds, however, when we buy or sell will soon convince us that such deliberate acceptance of a figure is not the normal condition under which we transact business. What is true is that if *B* means to

buy a horse, there is, in any given set of circumstances, a certain probability that he will pay any given price for the horse

This probability is great for low prices and small for high prices. Without doubt there is a price so low that, under any circumstances, *B* would buy the horse at that price, and another price so high that under no circumstances would he buy the horse for that amount. Between these two prices there is, for every set of circumstances, a continuous curve of decreasing probabilities from one to zero that he will buy the horse at any given intermediate price. It is clearly misleading to speak of a unique value between these two limits, and to call it his "valuation" of the horse. The buyer's valuation, like the seller's valuation, is merely a range of varying probabilities of effecting the exchange at different prices, and the exact price at which the exchange takes place will depend on the action of all the factors which have already been mentioned as effective circumstances in the total situation.

The individual valuation of an article, then, must be defined not as a single price above which an individual will certainly not buy it and below which he certainly will, but as the whole class of prices between the lowest one at which, under any circumstances, he would refuse the article and the highest price at which, under any circumstances, he would buy it. As a result of deliberation, this class of prices may be made very small, although it is doubtful whether even the most obstinate person who has made the most careful deliberation ever reduces it to a mathematical point.

4. Diminishing Valuation

The different amounts of effort which a man will make in order to attain various articles, or the different prices he will pay for them, are very clearly a function of the quantity of each of the articles which he already has. A man with nineteen sacks of potatoes will make less effort to obtain a single additional one, and will pay a lower price for it, than will a man similarly circumstanced in other respects who has only one.

This is the fact of *diminishing valuation*. Every successive increment in a man's store of a commodity will in general be less highly valued by him than the last. The amount for which a man will exchange a single part of his total stock of any commodity is the *marginal value* to him of that part*. The principle of diminishing valuation can be put in the form that as a man's stock of a commodity increases his marginal valuation of any part of it will diminish. The marginal value of a single sack of potatoes

* It should be borne in mind that a marginal valuation is really a class of possible prices, and not a single possible price.

to a man with nineteen sacks is less than it would be if he had only two. It is clearly the marginal value to him of a sack of potatoes, and not the total value of his whole stock of potatoes, that determines the price at which he will be willing to sell and to buy a sack of potatoes.

It is necessary to distinguish clearly between the fact that with nineteen sacks of potatoes a man desires an additional sackful less than he would if he had only two, and the fact that a single sack is less serviceable to him if he already has the larger number. Both facts are true, and the first is to some extent dependent on the second. They remain, however, different facts, and the dependence is by no means complete.

The fact that the man with the larger stock of potatoes will desire an additional sack less than the man with the smaller stock is a psychological fact. This psychological fact may be called the fact of *diminishing valuation*. This diminishing valuation is in part, but not altogether, the result of an external non-psychological fact that a new sack of potatoes is less serviceable or useful to the man with the larger stock. This external fact may be called the fact of *diminishing utility*.

Now it is clear that so far as a man's desire for commodities is founded on a deliberate and correct estimate of their serviceableness to him, his valuation of them will vary with their utility to him. Certainly he does sometimes make such a calculation, but, equally certainly, this is not always the case. Diminished craving with diminished usefulness is to be found in behaviour on a level far below that of reflective behaviour. The full-fed fowl ceases to peck at its corn, and there is every gradation of violence of effort for acquiring corn between the violence of the hungry fowl and the indifference of the satiated one. In other words, the behaviour of the fowl shows the phenomenon described in human behaviour as diminishing valuation. The fowl's strength of effort is graded to the physiological usefulness of an additional increment of corn to it. No one, however, would suggest that this gradation takes place because the fowl has calculated the usefulness to it of successive increments of corn as it became gradually replete.

Much human gradation of effort to utility is of exactly the same kind. In human beings, of course, processes of reflective thought interpose and may be the determining factors in deciding the valuation of a new increment of a commodity. An owner of motor transport, for example, deciding whether he would benefit by having an extra motor-lorry sufficiently to compensate for the expense, does so by processes of reflection. He does not allow himself to be guided by the strength of his craving for a new

motor-loiry It is equally true, however, that the housewife's valuation of an additional $\frac{1}{4}$ -lb of tea per week is determined in a way much more like the purely physiological determination of the amount of corn after which the fowl stops pecking The process involved is more complex because the demand of the housewife for tea is not determined simply by the strength of her craving for tea but by a relationship between the strength of this craving and of her craving for the money equivalent of the tea or for the other goods which could be bought with that money Her diminishing valuation of successive increments may, nevertheless, be as little the product of deliberate calculation as the diminishing valuation of corn by the fowl

The use of the language of deliberate calculation for conflicts in which only cravings come into play is an example of 'the intellectualist fallacy', and must be avoided if we wish to build our economics on a psychology which is not fanciful

There are thus two psychological conditions of demand from which the fact of diminishing valuation will follow These are when valuation is determined by deliberate calculation of utility and this calculation takes into account the diminishing utility of successive increments, and when the craving underlying valuation is determined by physiological or psychological factors which decrease in strength as more of the commodity is acquired

Neither of these conditions may be fulfilled and then there will not be diminishing valuation The relationship between desire for a commodity and the amount of it already possessed is a function of the special conditions, physiological or external, under which cravings are set up These are not only different for different cravings but different for different degrees of satisfaction of the same craving

Let us consider, for example, the case of a man short of food It happens to be a result of the physiological conditions of craving for food that a small but insufficient amount of food stimulates the craving to the maximum Persons who have carried out long fasts say that the intense desire for food disappears almost completely after the first few days A man who is having no food at all, therefore, may be found to desire food less—and therefore to put a lower valuation on a given increment of food—than a man who is eating daily an amount insufficient to keep him alive The curve showing the progress of the valuation of food as the amounts of it increase will not therefore at its beginning show the decrease we should expect from the principle of diminishing valuation

A differently shaped curve would be obtained for the valuation of water when the supply is insufficient, for the craving for drink

has not a correspondingly low strength if the person in question has no water at all. Again, the curve for alcoholic drinks is different from that for water, and does not show the sharp decline after thirst is quenched, which is characteristic of the curve of the desire for water.

Failure of diminishing valuation to result from diminishing utility is, in general, caused by the fact that a craving may have an element which is not graded to the actual need of the individual for the commodity craved for, and which is not altogether under the domination of his deliberate calculation. So far as this ungraded element is dominant, there will be no diminishing valuation of things as his stocks of them are increased, although there is obvious diminishing utility. The miser values his ten thousandth sovereign no less than he did his hundredth, although its utility to him may have reached vanishing point.

Probably there is a similar ungraded element in the craving for money amongst people who are not misers, although it also seems likely that this element is of very different strength in different individuals. The reluctance of a man earning £5,000 a year to spend five shillings on a taxi may be little less than that of a man earning £500 a year, although a calculation of the relative utility of five shillings to the two men would lead us to expect that the difference would be very large.

This ungraded character of the craving for money is of considerable economic importance since it causes the acquisition of money to be a motive which may not cease to be effective as a stimulus to economic behaviour when a large amount of it has been acquired. The business man does not cease his business activity when he has gained sufficient money to satisfy the wants that he had when he started. Rather he intensifies his money-acquiring activities. The cravings for power and for social prestige may be also ungraded and therefore also lastingly effective economic motives.

Not only, however, as in the cases considered above, may it happen that there are special reasons arising from the nature of a craving that prevent valuation from diminishing with successive increments although utility does diminish, it is also sometimes true that utility itself does not decrease when the amount of a commodity already possessed becomes greater. This is plainly true, for example, in the case already discussed of a man short of food. The condition of the man with no food at all is clearly no worse than that of the man with insufficient to maintain life, so the utility of increments of food which are not sufficient to maintain life is negligible, while the utility of the increment which is just

sufficient to maintain life would be inestimably great. The principle of diminishing utility will not, therefore, apply to the increments of food up to the amount just necessary to maintain life.

There is, similarly, no reason why a man acquiring a collection of old paintings should show diminishing valuation of later pictures as his collection increases. There is no external reason for a diminishing valuation of successive pictures, for the utility of a single picture bears little relationship to the number he has, and there is no obvious physiological or psychological reason why his desire for a picture should be less when he already has a large number. The collecting of Great Auk's eggs has been instanced as an example of a want in which there would be increasing and not diminishing utility, for each additional egg added to the collector's hoard would increase the unique quality of his collection.

Consideration of such cases as these has led economists to make the distinction between *saturable* and *insaturable* wants. Insatiability of a want may arise, as we have seen, from the special economic conditions in which successive increments are not of progressively less utility (and are therefore not diminishingly valued even if valuation corresponds to utility), but more commonly it springs from the fact that cravings do not necessarily decrease as the amount possessed of a commodity increases, even though the utility of successive increments does decrease. For prediction of human behaviour it is necessary to bear in mind that many more wants are relatively insatiable than one would expect if behaviour were entirely rational. At the same time, there is no sharp line between saturable and insatiable wants, since many cravings not wholly insatiable have a certain ungraded element, so that the strength of the craving is in part independent of the amount of the commodity already possessed.

5. Market Values

The prices at which commodities are bought and sold in shops are obviously not arrived at by a process so simple as the interaction between the valuations of a single buyer and a single seller described in the last chapter. There are different forces, some external and some psychological, which produce the values at which common commodities are exchanged, *i.e.* their *market values*, or *exchange values*.

A psychological factor which is operative in determining the exchange values of commodities sold in open markets is still clearly the valuation of them by possible buyers. A commodity would not be sold at all unless a sufficient number of buyers valued it enough to make it possible for it to be placed on the market at a price

which would ensure a profit to the seller. Clearly, too, it is normally the marginal valuation of the buyer which determines the price he will pay for a commodity.

If I go into a shop to buy a pair of socks, the possibility of a sale taking place will depend on whether the market price of the socks falls within the class of prices which correspond with my marginal valuation of the socks. If more is demanded for the socks than the upper limit of my marginal valuation, I shall certainly not buy them, and if it falls below the lower limit of my marginal valuation I certainly shall buy them, and for the varying prices between the upper and lower limits of my valuation there will be varying probabilities that I shall buy. Whether I shall buy or not depends, as we have already seen, on a variety of circumstances affecting my buying, such as the persuasiveness of the shop assistant and the effect on me of advertisements.

The indefiniteness of the point at which a buyer will cease to buy goods is an important factor in the psychology of market valuation, for it is the psychological factor which produces the well-known phenomenon that when the supply of an article is so great that the demand for it, at a price remunerative to the manufacturer, appears to be exhausted, a further demand can be created by judicious advertising. The advertiser is controlling one of the conditions under which a buyer makes his purchases, and the effect of his operations is to make the buyer pay a price higher up in the scale of his marginal valuations, and so purchase a larger total quantity before the point is reached at which he ceases to buy.

Buying such articles as socks from a shop obviously differs from buying a horse at a fair in the fact that there are a number of possible buyers and a number of possible sellers, and competition between these different buyers and between the different sellers plays a large part in determining price. What determines the lowest price at which socks can be sold is not, of course, a psychological factor, but is the seller's cost of production, taking into account payment for raw materials, labour and administration, payment for use of capital, and return on the other sales. What determines the number which can be placed on the market is the marginal valuation of the whole class of buyers. This marginal valuation will obviously decrease as the supply of socks to the market is increased, because as each buyer buys a certain number of socks his marginal valuation for a pair of socks will decrease. Pairs of socks can therefore only be placed on the market in such numbers that the marginal valuation of a pair of socks by buyers will not fall below the price at which it is economically possible to sell them.

The fact that, as the supply of a product is increased, the price at which that commodity can be sold decreases, is expressed by the *Law of Demand*. It will thus be seen that the psychological fact of diminishing valuation by individuals is the root of the Law of Demand.

6. The Psychological Roots of Economic Value

A common statement of the theory of the desires leading to economic values reduces them to the needs of the moment, and the need for accumulation for future security. The matter is sometimes further simplified by treating these motives as purely egoistic. Since, however, the average man is occupied in satisfying the needs and securing the future of his wife and family as well as of himself, these motives must be regarded as derived from the reproductive system of behaviour tendencies as well as from the self-preservative system.

We have seen, moreover, that there is good reason for supposing that there is also a tendency to accumulate wealth not limited by immediate needs or future security. There seems to be a specific drive to acquire and retain money and goods for their own sakes and not for any further end that they will serve.

The truth seems to be that the impulse behind economic behaviour may come from many psychological roots and not from the few which have been singled out by the theoretical economists of the past. A desire may originate from any behaviour tendency and desires from any of these origins may be productive of economic values.

The tendency to dominate over others (or self-assertion) may originate desires resulting in economic values. The capital value of a large newspaper, which, unlike most investments, bears no simple relation to its revenue-producing capacity, arises very largely from its possibility of satisfying the self-assertive tendency.

The social behaviour tendencies, moreover, can be productive of values, and of efforts to attain those values. Members of combatant nations sacrifice their lives and sometimes even their fortunes for their respective countries, not because they performed calculations which convinced them that such conduct was to their own advantage or to the advantage of their children, but because they had formed sentiments of loyalty to their country. These sentiments gave their country's welfare a value, and produced efforts for the attainment of that welfare in which their own more private values were sacrificed.

Similarly, the values of fashionable articles of clothing and of certain kinds of jewellery come from desires originating within

various social behaviour tendencies such as that of primitive comradeship. At a time when the wearing of a hat of a particular shape is fashionable amongst women, hats of this shape acquire a value through the desires of women to be dressed in accordance with the fashion. When this particular fashion passes away, the value of the articles conforming to it is very largely lost.

The truth is that no human desires, except those springing from the most primitive and general impulses of hunger and thirst, do, in fact, grow up independently of the individual's social environment. Every individual desires those things that he hears other people speak of as desirable. In other words, his desires, like his opinions, are open to the influence of suggestion from the body of consumers. The demand for an article is not a mere resultant of a large number of independent desires but is in part the product of the interaction of all these desires on each other.

Advertisers are aware of this fact when they try to induce consumers to obtain articles, not by describing their utility, but by suggesting that they are articles which other people value. This appeal may take the simplest possible form, as when an advertiser says that everybody is rushing to buy the articles he is advertising, or by the more obscure implications of such words as *chic* or *smart*, which are frequently applied to an article for the increase of its sales.

Desires productive of value do not arise only from those dispositions which are common to all men but also from the dispositions acquired in the lifetime of an individual—in other words, from his sentiments. The desires for water and for meat belong, for example, to the first of these two classes, while a collector's desire for old china belongs clearly to the second.

Sentiments of hatred can also affect values. After a war, for example, the exchange values of articles manufactured in the enemy countries by the surviving sentiments of hatred making people unwilling to buy articles made in the enemy country. Hatred can, of course, also increase values. The value of a knife or a revolver is increased for a person whose sentiment of hatred has led him to decide to commit murder, just as shells and high explosives acquire values for a combatant nation.

The desire which produces an economic value may also arise from a habit. No careful student of human behaviour can fail to notice how frequently desires and values are generated by habits. This is particularly noticeable amongst old people, but is in no way confined to them. Objects which have been habitually used acquire a value to the individuals who have become habituated to them, which may be much greater than an outside observer would consider to be justified by their real utility.

Although its physiological basis is complex, we have in the desire for drugs, too, a value which is mainly the result of the laws of habit. It is probable, moreover, that the economic value of most objects has in it an element which is due to habit. In order to obtain the articles to which we have become accustomed we make efforts greater than would result from impartial calculation of their utility, and such articles therefore owe part of their value to desires originating from habits.

We have already seen that desires originating from a sentiment of hatred increase some values while they reduce others. A man desiring to commit murder will attach high value to a lethal weapon which would be valueless to his fellow citizens, while his murderous desires may destroy the value for him of other objects such as a prayer book or a concert ticket.

Similarly, desires arising from within any other system will reduce some values while enhancing others. A religious sentiment will reduce the value to its possessor of intoxicating liquors and of revolvers while it enhances his valuation of prayer books and of objects which may be used in the performance of good works.

We cannot, therefore, divide desires into the classes of those which reduce and those which increase values, for every system from which desires spring will be found to increase some values and to reduce others. We can, of course, decide that some objects which men value are better deserving of their desire than others, and we may notice that some sentiments lead to these desires while others reduce them and lead men to value other things less worthy of valuation. This, however, is an ethical judgment with which neither economics nor psychology is concerned. The desires for whisky and revolvers are psychological facts as are the desires for prayer books and hospital stores, and the consequent values are economic facts no less in the one case than in the other.

7. The Psychological Inadequacy of Certain Traditional Accounts of Human Behaviour

In the earliest attempts that were made to provide an account of the motives which led to the sort of human behaviour that is of interest to the economist—such as buying, selling, and earning one's living—writers were often content to explain human motives by means of a very simple formula. This formula generally took the form of stating that men only acted from self-interested motives, and that all human behaviour could be reduced to a seeking for pleasure and avoidance of pain. There was sometimes a grudging recognition of impulses, such as those belonging to the sex and parental modes of behaviour, which were not self-interested. Often

these too were reduced to the pain-pleasure formulation. There was rarely any recognition of socially directed impulses.

It cannot be emphasised too strongly that the objection to this kind of theory is not that it is ethically unsatisfactory but that it is psychologically wrong. If a man were, in fact, moved by self-interested motives only or by the desire for pleasure and repugnance from pain, it would be the duty of economists to found their psychological theories on this fact whether or not it was repulsive to their moral sense.

It is odd that Marshall, when he is discussing the objections to the theory that in the choice between two actions a man will follow that course which yields him the greater pleasure, seems to consider it necessary only to deal with the moral objections to the identification of desiring a thing and desiring a pleasure which that thing will bring.¹⁸⁶¹ The real objection is that this confusion is a psychological error. If I hit a man because I am angry with him, that is a different thing from hitting him because I expect pleasure from the effects of the blow.

Economists are, of course, generally aware of the inadequacy of the older psychological foundations. We could hardly find a clearer recognition of the variety of the sources of human behaviour than is shown by the following extract from Marshall, in which he describes the individual to be studied in economics as ‘ a man of flesh and blood, influenced by egoistic motives and shaping his business life to a great extent with reference to them, but not above the frailties of vanity or recklessness and not below the delight of doing his work well for its own sake, not below the delight in sacrificing himself for the good of his family, his neighbours, or his country, and not below the love of a virtuous life for its own sake’ (p. 89).¹⁸⁶¹

Economists are not, however, the only people who write on economic problems, and a great deal of the popular thinking on economic questions as expressed in letters to newspapers and political speeches is based on the foundations of an out-of-date psychology. The ideas that behaviour is based on expectation of pleasure, that man acts only from self-interested motives and that human nature never changes, are all parts of this foundation. These principles are often regarded as axiomatic, while statements of economic laws which are, in fact, no more than descriptions of what happens in the present social situation are treated as if they were necessities of thought which must be true in all social situations.

That there are certain psychological limitations within which constructive economic changes must work, no one would, of course

dispute. These limits are determined by such facts as that it is easier to change external institutions than it is to change people's mental habits, that many of the basic drives behind human behaviour tend to remain active even when they are denied their customary outlets although their activity can be diverted to new ends, and also that behaviour of a socially desirable kind (such as that involved in the production of wealth) will only take place if social conditions are adapted to give adequate motives to such activity. These, however, are psychological propositions of a totally different order from the pseudo-psychological laws of popular economics, and hold out much more hope of beneficial changes in our social system.

CHAPTER XX

THE USE OF STATISTICAL METHODS

1. Why Statistical Methods are Necessary

A great part of psychological research consists of quantitative experimenting. When any experiment has been done whose results can be expressed in numerical form some kind of arithmetical treatment of the results is necessary, not only in order that the results may be in a form convenient to communicate, but also in order that we may discover what conclusions can legitimately be drawn from the measurements which have been made. The system of techniques used for these purposes is that of statistical methods.

These methods must be used if one is to have a principle for determining when to draw conclusions and what conclusions to draw. To neglect them exposes the investigator to the danger of drawing conclusions when they cannot properly be drawn and to the danger of failing to draw conclusions when they may be drawn, and also to a perpetual uncertainty as to the degree of conviction with which he can assert any conclusion to which the results appear to point. One cannot escape this necessity by always basing conclusions on results from large numbers of individual subjects. It is very uneconomical to use one thousand subjects to support a result which could have been adequately proved by means of forty, and the multiplication of experimental subjects does not achieve the result aimed at. One must still use statistical methods of examining the results to see whether one thousand subjects was really enough.

One cannot either carry out quantitative psychological research or understand how the research of others has been carried out without some understanding of statistical methods. Many students are unnecessarily discouraged by the prospect of acquiring this knowledge since they feel that they have insufficient mathematical ability. There is no reason for this discouragement. The mathematical operations that they will be required to perform will only be those familiar to the elementary-school child: addition, subtraction, and occasionally multiplication, division, or the finding of a square root, for which tables can be used. It must be admitted that the work of a statistical calculation may be arduous as a result of the large number of figures with which one has to work, although much can be done to reduce this element of drudgery by the use of tables and calculating machines.

The real trouble is not the difficulty of the mathematical operations themselves but the difficulty of getting an insight into the ways in which they are used, particularly if one tries to get this insight by merely reading about them and not by using them. One must consider that statistical methods are not a set of facts that one has to remember but a skill that one should try to acquire. It is by use that one acquires skill, and the best way of getting familiar with statistical methods is to provide oneself with simple numerical material on which they can be used. In order to understand, for example, how to investigate the significance of two means, the student may make twenty independent attempts to draw a line five centimetres long, and find out whether his mean is significantly different from the mean of a similar set of estimates made by a friend. In the same way, he can obtain data for working out correlations by applying two or more similar simple tests to a number of friends. Ways of getting data for trying out the other methods described will be found without much trouble. The use of the methods will then be clearer to him than they could ever become by merely reading about them.

He need not be deterred by the fear that he has insufficient mathematical knowledge. If he can solve a crossword puzzle, he will find any of the statistical methods described in these chapters at least as easy.

2 The Problem of Significance

The central purpose of the application of statistical methods to the quantitative data of psychology or of any other science is to enable us, when we get a numerical result which seems to indicate the presence of some cause affecting our figures in a particular direction, to discover with what conviction we can conclude that this is a real effect and not merely the result of chance. For example, we may give a subject some task of discrimination, how often must he succeed before we can safely conclude that he really can make the discrimination and is not just succeeding by chance? Or a group of boys succeed better in a certain test than do a group of girls, how much better must their average scores be before we can safely conclude that boys really are better than girls in the performance tested?

Let us begin by considering a case so simple that the probabilities can be easily calculated from first principles. Suppose we wanted to test the claim of someone that he can distinguish butter from margarine by taste alone with his eyes shut. We should bandage his eyes and then give him a succession of samples of either butter or margarine, requiring him each time to say which

he was receiving. In order that he might not guess from the nature of the last sample what the next was likely to be, we should present the samples in a random order determined perhaps by the sequence of odd and even numbers in a table of random numbers. If he were merely guessing without real knowledge, his probability of being right would be $1/2$ on each occasion. Let us suppose, for the sake of simplicity, that he always gave the right answer. How many guesses should we need to convince us that he really could tell the difference and was not merely getting right by chance? Obviously we should not be convinced by one right answer, since this might have happened by chance alone once in two times. Nor should we be convinced by two successive right guesses, since the probability of him being twice right by chance is $1/4$, which is not small enough to carry conviction that chance is not the explanation. Suppose now that he were right in all of five guesses. The probability of this happening by chance would be $1/2^5$ (i.e. $1/32$) which we might feel sufficiently unlikely to make the explanation by chance a very unlikely one. Here however, a scruple arises. Suppose he had been wrong every one of five times. This would have been just as good evidence that he could distinguish butter from margarine as if he had got them all right, only he would be naming them wrongly. The probability that he will get either all right or else all wrong in five guesses by chance alone is not $1/32$ but $1/16$, and he must guess six all right before the probability of him showing apparent evidence for ability to discriminate by chance alone is as small as $1/32$.

This quantity, which measures the probability that a certain number of answers appearing to indicate the ability to discriminate might occur by mere chance, is indicated by the symbol P . In the present case, when six guesses have been made which are all correct, $P = 1/32 = .031$. The evidence for a real causal factor being present (in this case the ability of the subject to make the required discrimination) is that P must be sufficiently small to make the explanation by chance a very unlikely one. When P is sufficiently small for this purpose, we say that the result obtained is *significant*, i.e. that it signifies the presence of a real cause acting in the direction indicated. Conventionally, a value of $P = .05$ is taken as just sufficiently small for significance.

Since this value of P is always calculated as the odds against a given deviation from expectation occurring in either direction, six right guesses would be just enough to satisfy this minimum criterion of significance. We could then say that the evidence was just good enough to satisfy us that our subject could really distinguish between butter and margarine. We should, of course,

feel more convinced if he guessed right in every one of seven trials which would satisfy the more exacting criterion of $P = 0.2$ and still more with eight successes in eight trials ($P < 0.1$)

At first sight it would seem more satisfactory to use a much more rigid criterion of significance than this (as was at one time done) to refuse, let us say, to draw conclusions unless the likelihood of a result occurring in a chance series was less than one in a thousand. The advantage of such a severe criterion is seen, however, to be largely illusory if we consider that there are other sources of error in drawing conclusions besides the danger of mistaking a chance effect for one proceeding from a real cause. There is no real advantage in making the first source of error very much smaller than the possibility of error arising from defects in the experimental conditions. A much more serious objection to the use of a too-severe criterion is that it would make it certain that we should often fail to draw a conclusion as to a real causal effect when such a positive conclusion was the correct one.

A further point about the use of P as a criterion of significance is that the simple calculation given above depends on the assumption that we are considering either all the data available from our subject or else an unselected sample of that data (*i.e.* a sample not selected because it is favourable to the hypothesis under test). Let us suppose, for example, that our subject was right three times out of six on Friday, two times out of six on Saturday, and all right out of six on Sunday. It would not do to argue that his power of discrimination was proved by the Sunday experiment because the probability of getting all right by chance on that day was $1/32$. The chance probability of getting all right on the best of three trials is considerably greater than this. It seems obvious that if we had tried him on thirty-two occasions, the odds would be in favour of him succeeding at least once by chance in a task of which the chance expectation on a single occasion was $1/32$. If the subject has tried on three occasions, the question that must be asked is how likely it is that he will succeed at least once by chance in a task whose chance expectation is $1/32$. This probability is, in fact, approximately $3 \times 1/32$, so P is about 1 , which is too large for significance*. If, however, he had got all right in seven trials on the best of three occasions, P would be $3 \times 1/64$, which

* If the chance probability of an event is P , the probability (P') of it occurring at least once in n trials, is $(1 - Q')$ where Q' is the chance of it not occurring during the n trials. $Q' = (1 - P)^n$, so $P' = 1 - (1 - P)^n = nP - n(n-1)P^2/2 + n(n-1)(n-2)P^3/6 - \dots$. If nP is small, terms after the first of this series will be small enough to be neglected, and we may take P' as nP . If, however, nP is not small enough for this, the exact value of P' must be worked out from the formula $P' = 1 - (1 - P)^n$.

is about .05 and could be regarded as just significant evidence of the ability to discriminate on the successful occasion. It is therefore legitimate to select data, provided one uses a method of estimating significance which makes allowance for the selection that has taken place.

I have so far supposed that our subject was always right in his answers, because this makes the arithmetical reasoning simpler, but in practice we are not likely to be so fortunate. It is more likely that he would not always succeed (through occasional inattention or boredom or because his power of discrimination was not perfect). He might, for example, get twelve right answers in sixteen guesses, i.e. a deviation of four right answers from the expectation of eight if he had merely been answering at random. We must then ask how likely it would be by chance alone that we should get a deviation of four or more than four, in either the positive or negative direction, from the expected number of eight by chance alone. That would be the value of P . To answer this question we should either have to make a considerably more complicated calculation or, more conveniently, take advantage of the calculations already performed by other people by using one of the mathematical tables for statistical workers. If we found that the likelihood so determined was less than .05, that would be just as good evidence that our subject could really distinguish between butter and margarine as would be provided by him getting all right in some smaller number of guesses which gave the same value of P .

We must always make an estimate of significance before venturing to draw a conclusion from any apparent indication of our numerical results. Failure to do so leads to confusion through the possibility of different investigators drawing different conclusions from their data, some of which may merely be chance characteristics of their numerical results.

3. The Theory of Sampling

The reason for the necessity of making a calculation to determine the significance of a numerical result is that we cannot in general make an exhaustive study of all the cases in the world of whatever we may be enquiring into, we are forced to study a limited number of cases and to discover how certainly we may infer from this limited number the properties of the larger group from which it has been drawn. The limited number of cases studied is called our *sample*, and the larger group of which it is representative is called the *population*.

This sampling method, which we adopt for obvious practical reasons, has its own sources of error. Some of these can be avoided

by care in making up our sample, others are always present and the error due to them must be estimated by the use of an appropriate statistical method

The most obvious of the avoidable sources of error is that due to some process of selection in the manner of making the sample which makes it not truly representative of the population from which it is drawn. Let us suppose that we want to know the average intelligence quotient of a school and ask the headmaster to send us a sample of twenty boys. It is very likely that the headmaster will send us twenty of the brightest of his boys, and our results will be falsified because with respect to intelligence they are not representative of the population from which they were drawn. Nor would it have done if he had sent us the boys with the cleanest faces, because these might very well prove to be on an average more intelligent than the boys with dirty faces. The best way to obtain a truly random sample would be to get the headmaster to send us an alphabetical list of the boys and to select every thirtieth name.

Let us suppose, however, that we have succeeded in getting a truly random sample of boys, we are still faced with the unavoidable difficulty that our measurement will be to some extent vitiated by a *sampling error*. In our sample of twenty boys every one will have a different intelligence quotient, and these may range from about 60 to 140 or more. By taking an average for the whole twenty boys, we certainly reduce the effect of these individual differences, but we do not get rid of it entirely since we have no reason for supposing that those above the average intelligence (of the whole school) in our sample will exactly balance those below. If we had chosen another random sample (as we might by taking the twenty-ninth, fifty-ninth, eighty-ninth, etc., boys in the list) it would have given us a somewhat different average. So the exact value of the average obtained will depend on the particular sample chosen, and this must always be the case when we draw a sample from a population of individuals differing quantitatively with respect to the character we wish to measure. There is thus, in the average obtained, a margin of uncertainty which results from the *chances of sampling*. It is true that this margin of uncertainty could be made less by taking a larger sample. In fact, it will be reduced in proportion to the square root of the size of the sample, we must take four times as many boys to make it half as big. But limitations of time prevent us from making our samples indefinitely large, and increasing them only makes the margin of uncertainty smaller, it does not get rid of it altogether. So we must have some method of estimating how large this margin of uncertainty is likely to be

Parallel problems arise if we give the same individual a number of measurements in, let us say, an intelligence test. We do not always get the same result any more than we do if we make a fine physical measurement such as the measurement of the diameter of a wire by means of a micrometer. We express this fact by saying that the measurement has been vitiated by *errors of measurement*. It is sometimes felt that this term is inappropriate in psychological measurement since all differences must be due to some real difference in the subject: on one day he is feeling tired, or uninterested or the questions asked happen to be unfamiliar to him. This may well be true, but the differences are errors in the measurement of his intelligence, not because they have not real psychological causes but because they are irrelevant to the purpose of the measurement. In the same way, the differing intelligence of the individual boys in the school are undoubtedly real. It is a fact and not an error that Bill Jones is much brighter intellectually than Tom Smith. Yet there is no inconsistency in treating them as errors if we consider that the essential character of error is its irrelevance to the purpose of the measurement. The difference between the intelligences of Jones and Smith is irrelevant to the purpose of finding the average intelligence of the school. It is not, therefore, surprising to find that these differences, like the differences between different measurements of intelligence for any one individual must be treated by the *theory of errors*.

Since one individual boy differs from another in intelligence we have not full information about the intelligence of the school if we merely know the average. We need also to have some *measure of scatter*, i.e. a number indicating how widely individual values differ amongst themselves.

The *variance* is a measure of scatter obtained by squaring the deviations of each individual result from the average of the whole sample and finding the mean of these squared deviations. When, as is usual, the average is itself estimated from the sample, the best estimate of the variance is given by dividing the total of the squared deviations not by the total number of cases in the sample but by the number of *degrees of freedom*, which is one less than the total. If the number of cases in the sample is denoted by the symbol N , the divisor for the variance is therefore $(N - 1)$. The variance has the convenient property that, if different sets of uncorrelated measurements are summed, the variance of their sum is equal to the sum of their separate variances. This property has many applications. If we have N test results with variance V the variance of the total of the N results will be $N \times V$, while that of the average of the N results will be V/N . We may want to know

the variance of the difference between two sets of test results. This will be the same as the variance of their sum, *i.e.* it will be the sum of their separate variances.

In practice, the most commonly used measure of scatter is the square root of the variance, the *standard deviation*. This is generally denoted by the symbol σ . If we use the symbol X for the test measurements or other variates for which these quantities are calculated, and x for the deviations of these from their common mean, and Σ for the operation of summing all the members of a class, then the arithmetic mean or average can be expressed as $\Sigma X/N$, the variance as $\Sigma(x^2)/(N-1)$, and the standard deviation as $\sqrt{\Sigma(x^2)/(N-1)}$.*

The process of obtaining the variance and standard deviation by summing the squares of deviations from the mean is shown in Table 1, in which the twelve variates are results of the Cattell III intelligence test (*i.e.* I Q s) obtained in a sample of twelve graduates. These show a mean of 146.9 and a variance of 88.27, which is equivalent to a standard deviation of 9.40.

CALCULATION OF VARIANCE AND STANDARD DEVIATION

TEST RESULTS	DEVIATION FROM MEAN	DEVIATION ²
154	+ 7.08	50.1264
134	- 12.92	166.9264
146	- 9.2	84.64
151	+ 4.08	16.6464
148	+ 1.08	1.1664
151	+ 4.08	16.6464
155	+ 8.08	65.2864
129	- 17.92	321.1264
152	+ 5.08	25.8064
158	+ 11.08	122.7664
134	- 12.92	166.9264
151	+ 4.08	16.6464
Total	1763	970.92
Mean	146.92	- 11
		Variance = 88.27

Standard deviation = $\sqrt{88.27} = 9.40$

Table 1

This process (of summing squares of deviations from the mean) leads to the variance by the most direct route, but it is too laborious

* Some students of psychology unfamiliar with mathematics have the impression when they see the symbol " Σ " that they are entering a region of higher mathematics which they cannot be expected to understand. This is far from the case. " Σ " is simply a convenient shorthand symbol for "add all the so-and-so's together" which is an operation quite familiar in the lower forms of the primary school.

for practical use. If the original measurements are whole numbers, we may save trouble if we avoid the necessity for squaring decimals by adopting the device of calculating the deviations from some convenient whole number near the mean, afterwards applying to the sum of squares so obtained a correction to bring it to the value it would have had if the deviations had been taken from the true mean. This method is shown in the second and third columns of Table 2. Here the deviations have been calculated from 150.

ALTERNATIVE METHODS OF CALCULATING VARIANCE AND STANDARD DEVIATION

	(1) BY DEVIATIONS FROM 150		(2) FROM ORIGINAL SCORES
TEST RESULT	DEVIATION	DEVIATION ²	(TEST RESULT) ²
154	+ 4	16	23716
134	- 16	256	17956
146	- 4	16	21316
151	+ 1	1	22801
148	- 2	4	21904
151	+ 1	1	22801
155	+ 5	25	24025
129	- 21	441	16641
152	+ 2	4	23104
158	+ 8	64	24964
134	- 16	256	17956
151	+ 1	1	22801
Total 1763	- 37	1085	259985
Correcting term	$-(-37)^2/12 = -114.08$		$-(1763)^2/12 = -259014.08$
Corrected sum of deviation ²	970.92		= 970.92

Table 2

instead of the mean of 146.92. The sum of squares of deviations so obtained must now be corrected by subtracting from them the quantity $N \times (150 - \text{mean})^2$, i.e. $12 \times (150 - 146.92)^2$. This is, in fact, numerically the same as the square of the sum of the second column (of devns. from 150) divided by N , and it is somewhat more convenient to calculate the correction in this way. This quantity must always be subtracted from the sum of squares whether the number chosen is smaller or greater than the true mean. After making this correction, we find we have exactly the same sum of squares as that obtained in Fig. 1, with much less labour. This is the method which should ordinarily be used by the psychologist who has to calculate a variance or standard deviation, unless he has a calculating machine, in which case he can cut out one step in the process, as shown in the last column of Table 2, by summing the squares of the original variates without calculating any deviations and then subtracting from this sum the square of the total of the original variates divided by N . This again gives the same result, but the

squaring of large numbers is unnecessarily labourious unless a machine is used

Galton used a different representative value and a different measure of scatter from those described¹⁰² Instead of the mean, he used the *median* as representative value This is the middle value when all values are written out in order of size, *e.g.* 151 in the sample shown in these tables His measure of scatter was the *semi-interquartile range*, which is half the difference between the value a quarter of the way along and the one three-quarters of the way along such an order of merit In this sample this quantity would be 6 In a large normally distributed sample the semi-interquartile range is about two-thirds of the standard deviation At one time it was customary to multiply standard deviations by the factor 6745 to convert them into estimates of the semi-interquartile range (then called the probable error or P.E.), but this conversion has no advantage over the use of the standard deviation itself and has now generally been abandoned

We are now in the position of knowing that the mean intelligence quotient indicated by our sample is 146.9, and that the amount of scatter between different individuals appears to be that measured by a standard deviation of 9.4 The next question that we are likely to ask is how reliable is this mean of 146.9 as an indication of the mean intelligence of the population from which the sample was drawn? It is common knowledge that the reliability of such a sample becomes greater as the size of the sample is increased It is also easy to understand that it is less as the scatter between different individuals is increased The appropriate measure of the margin of error to be expected in the mean is, in fact, the quantity σ/\sqrt{N} , *i.e.* the standard deviation of the mean, which is known as the *standard error* In the present case, the standard error of our mean is $9.40/\sqrt{12}$, which works out as 2.71 Knowing this quantity we can estimate within what limits our calculated mean from the sample is likely to be right

The way of doing this depends on information given in mathematical tables as to the likelihood of the true value lying within the limits of the calculated value and some multiple of the standard error Thus, if N is large, the odds are 19:1 that the calculated mean is not more different from the true mean than about twice its standard error (exactly 1.96 S.E.) These odds are represented by the symbol P and are expressed by saying $P = 0.05$ This, as has been mentioned earlier, is generally regarded as a satisfactory estimate of the reliability of the mean, although one would feel more confidence that it lay within the limits of ± 2.3 S.E. ($P = 0.02$)

and still more that it would lie within the limits of ± 2.6 S.E. ($P = .01$). Since the total number of cases is only 12 for the calculation of the mean in our sample the corresponding coefficient by which the standard error must be multiplied to give the limits of reliability are somewhat greater (2.2 S.E. for $P = .05$, 2.7 S.E. for $P = .02$, and 4.4 S.E. for $P = .01$).¹ Thus the mean of 146.9 obtained from the group of twelve students in the above table is a sufficiently reliable indication that the true value of the mean as obtained from an indefinitely large sample would lie between the limits $146.9 \pm (2.2 \times 2.71)$, that is, it would lie somewhere between 141 and 153.

This gives a pretty wide margin of uncertainty, as one might suppose, a sample of 12 is too small for a reliable estimation of the average intelligence of the population from which it was drawn. On the other hand if all we wanted to know was whether the graduate students were of better than average intelligence, the sample of 12 is enough to give a perfectly definite answer. The average intelligence quotient of the whole population of the country is (by definition) 100, and the difference between this and the measured mean of our sample is 46.9, which is 17.3 times the standard error. Reference to the appropriate tables shows that the odds against the true mean lying as far as this from the calculated mean are incalculably small (of the order of a billion to one). So the sample of 12 would be sufficient to demonstrate that the students tested were above average intelligence, although it would be too small a sample to make a sufficiently accurate estimate of their mean intelligence if we wanted to know it with an error of less than about six points each way. In fact, the whole group of sixty-four students from which this sample of twelve were taken gave an average I.Q. of 148.7 with standard deviation of 9.60 and standard error 1.20, which may be compared with the estimates of 146.9 for the mean and 9.40 for the standard deviation given by the smaller sample.

It is important to notice the difference between the standard deviation and the standard error. The standard deviation is a measure of the scatter of our results. If we increase the number of cases in our sample, we should expect the standard deviation to remain about the same, although as the sample became larger it would be more accurately estimated. Thus in the above example σ was estimated as 9.40 by a sample of twelve and only changed to 9.60 when the sample was increased to 64. The standard error, on the other hand, is a measure of the amount of uncertainty attached to our mean. It will decrease as we increase the number in our sample. It will be expected to grow less as the sample is

* From t table for "Students'" method.⁸⁶

increased, roughly in proportion to the square root of the number of cases in the sample. By increasing the sample from 12 to 64, the S.E. was reduced from 2.7 to 1.2, *i.e.* to rather less than half its previous value.

4. Comparison of an Experimental with a Control Group

The psychologist is more often concerned with the significance of the difference between measurements obtained from two groups than with that of the significance of the mean of a single group. This problem arises, for example, if we ask such a question as whether intensive training in the learning of poetry will produce a general improvement of memory, such as would be shown by increased power to remember other kinds of material. We cannot settle such a question by an experiment on a single group of subjects. Let us suppose that we take a group of children and begin by testing their memory, let us say by testing their power to remember nonsense syllables. Then we give them intensive training in learning poetry for an hour or two each day for a month, and retest their power of remembering nonsense syllables. An improved performance on the second test would not, however, prove that their training had improved their memories. There are several other possibilities. The children, for example, are now a month older and their power of remembering may simply have increased with age, or the performance of the first test may have given them practice which improved their second performance, or the experimenter himself may with practice have improved in his technique of giving the test. All or any of these factors might have produced improvement without any real effect of the training in learning poetry.

These sources of error can be avoided, however, if in addition to our *experimental* group who are to have the training in poetry, we also work with a *control* group who are also tested by means of nonsense syllables at the beginning and end of the experiment and who differ from the experimental group only in the fact that they do not have the training in learning poetry. Evidence for the effectiveness of the training in poetry is then, not that the experimental group show an absolute improvement at the end of the experiment, but that they show an improvement relative to the control group. This use of a control group is an essential part of the technique of ensuring that the only variable condition which could have produced the effect observed is the one under investigation and that we have not been misled by the effect of an unintended variation of some other condition.

This check by a control group should never be omitted in an experiment of this kind. The most famous of recent physiologists, Pavlov, once published an account of an experiment in which he found that mice trained to run to food at the sound of a bell learned this trick very much more quickly in successive generations, suggesting the very important conclusion that learning by parents has inheritable effects facilitating learning by their offspring.²⁰⁹ Later, however, he found that the improvement was due to a change in the experimenter's technique and not to a change in the mice, a fact which would have been at once apparent if control groups of mice whose parents had not been trained had been used throughout the experiment.

The use of a control group is a necessary but not a sufficient condition for drawing from such an experiment the conclusion that training improves learning ability. It is also necessary to ensure that the two groups compared do not differ from one another in any other respect than the one under observation, *i.e.* in the fact that one has the training in poetry learning and the other has not. A careless experimenter, for example, might make up his experimental group by asking volunteers for a month's training in learning poetry while using the rest of the class as control. In this case it is pretty certain that the two groups would differ from one another since it is likely that the more intelligent members of the class would volunteer for the extra work, and if they did better than the control group in the final test this might be due to their initial superiority in intelligence and not to an advantage produced by the training.

In order to get a truly random division into experimental and control group, we may use some such device as writing the names of all the subjects to be used, in alphabetical order, and picking our subjects for each of the two groups by taking alternate names on this list. Another method which is sometimes preferred to random division is the use of *equivalent groups*, in which each individual in the one group is matched by an individual in the other group as much like him as possible in age or intelligence or ability in the operation to be tested. This method is not as much superior to the method of random grouping as is sometimes supposed, and it may be doubted whether it is worth the extra trouble. In practice one can make the groups equivalent only in one respect. They could not be made equivalent in age *and* intelligence *and* the special ability under investigation unless one had an indefinitely large population to choose from. When one has got this equivalence, the method is no more *valid* than that of random grouping, *i.e.* if it gives a significant difference, it is no more certainly an indication

of a real difference due to the difference in treatment of the groups than would be a significant difference obtained by the method of random grouping. It is, on the other hand, sometimes a rather more *sensitive* method, i.e. one is more likely to detect a difference by its means. This advantage of enhanced sensitivity is, however, lost if one uses the same statistical method for estimating its significance as that appropriate for the method of random groups. The statistical method which preserves the sensitivity of the method of equivalent groups is that described later for comparing two sets of scores by the same group of individuals.

It is also, of course, necessary to remember that the mere fact that the experimental group shows a numerically greater average improvement in score than the control group after the second testing does not in itself prove that they have obtained any advantage from their course of training. Unless by an odd chance the two scores happened to be equal, one of the average scores would be certain to be larger than the other even if the training had had no effect whatever. In ordinary speech we should say that such a difference was produced *by chance*. Before we can draw any conclusion from a comparative experiment we must be sure that the difference between the scores is larger than that which could be attributed to chance. Only then do we say that the observed difference is *significant* and feel justified in drawing any conclusions from it.

5. The Significance of a Difference between two Means

To determine whether the score of an experimental group is significantly greater than that of a control group, we must carry out a calculation similar in principle to that used for determining the limits of reliability of the mean of a single group. In the present case the question we must answer is whether the difference between the two means obtained from the two groups is significant. For this purpose we must calculate the standard error of the difference between the two means and use this to find out whether the observed difference between the means of the two samples is consistent with the possibility that the true difference as obtained from two indefinitely large samples would be zero. The square of the standard error of each mean is the variance of that mean and (as already mentioned) the variance of the difference between two quantities is the sum of their separate variance, so the standard error of a difference between two means is the square root of the sum of the squares of the standard error of each mean. We can express this in an equation:

$$SE_{(M-N)} = \sqrt{SE_M^2 + SE_N^2}$$

The reasoning is then the same as before. The odds are twenty to one that the true value of the difference which we should have got in the absence of sampling errors, or from an infinite sample, lies within the limits of our observed difference plus or minus twice its standard error. The problem in practice is not usually to determine how big the difference between the experimental and the control groups is likely to be, but whether there is any real difference at all. In other words, we want to know whether our results indicate with sufficient certainty that the difference is not zero.

We must see, therefore, whether the difference we have obtained is at least twice its own standard error. If not, we cannot be confident that there really is any difference between the two groups, we are not sure that the observed difference is *significant*. If the difference does exceed this amount, we say that it is significant, the odds are more than twenty to one against the observed differences having been caused by the chances of sampling, so we can state with sufficient confidence that there is a difference between our experimental and our control groups.

As an example of the application of this method we may take an experiment in which the same passage of prose was learned by two groups, each of thirty-two students,* one learning it by a passive method in which they read it over repeatedly to themselves during a period of five minutes, while the other group used for the same period an active method in which attempts to recall the passage were made between each reading of it. The score was the number of items remembered. The results are shown in Table 3.

METHOD OF LEARNING	N	MEAN SCORE	STANDARD DEVIATION	STANDARD ERROR
Active	32	6.50	2.10	.37
Passive	32	5.16	2.45	.435
Difference (A - P)		+ 1.34		.57

Table 3—The significance of a difference

It will be seen that the active method appears to be more effective than the passive method of learning, as judged by the average number of items subsequently recalled, with a difference in its favour of 1.34. This cannot, however, be taken as sufficient evidence that the active method of learning is really superior unless comparison of this difference with its own standard error shows it to be too large to be plausibly explained as an accidental deviation.

* These two groups happened to be of the same size but it is not a necessity of the method that they should be.

from zero. The standard error of the difference is, as has already been explained, the square root of the sum of the squares of the standard errors of the means by the two methods, *i.e.* it is $\sqrt{(0.37^2 + 0.435^2)}$, which is 0.57. The difference is more than twice this amount, so it fulfils the minimum requirement for significance. In fact, the ratio of the difference to its standard error, sometimes called the *critical ratio*, is 2.35, and reference to the table for normal distributions shows that this critical ratio will be exceeded by chance only about once in fifty times. In other words, the odds against so large a difference occurring by chance if the two learning methods were really equally effective would be 50:1. The evidence for the superiority of the active method of learning is strong enough for us to draw a reasonably certain conclusion that it is the better method of learning.

Sometimes it is possible to arrange an experiment in such a way that both measures are obtained from the same individual. Let us suppose, for example, that we wished to measure the speed of reading after taking a dose of alcohol and to compare it with the speed when no alcohol has been taken. Two passages could be taken which a previous test had shown were, on the average, read in equal times. A number of subjects (say thirty) would then read one passage in their normal condition and one passage after taking a dose of alcohol. One would then have a table of results which would look like the following —*

SUBJECT	(1) READING TIME BEFORE ALCOHOL	(2) READING TIME AFTER ALCOHOL	DIFFERENCE (2) — (1)
T. Brown	29 sec	32 sec	+ 3 sec
J. Smith	21 sec	29 sec	+ 8 sec
A. McKay	26 sec	27 sec	+ 1 sec
L. Jones	19 sec	25 sec	+ 6 sec
W. Gray	27 sec	31 sec	+ 4 sec
R. Lee	18 sec	23 sec	+ 5 sec

Table 4 —Differences between correlated measures

Although these results have a similar appearance to the two sets of readings that might be obtained from an experimental and a control group, they differ from them in an important respect which makes it necessary to give them different statistical treatment if maximum information is to be obtained from them †. Examination of Table 4 shows that the figures of the last column showing

* These are fictitious figures, not actually obtained from an experiment of the type described.

† This is also the appropriate statistical treatment for results obtained by the method of equivalent groups. (See pp. 321 ff.)

the differences differ less amongst themselves than do those of either of the other columns, whereas the variance of the difference between two independent sets of figures such as those obtained from an experimental and a control group must always be greater than the variance of either separately. The reason for this peculiarity is that the two sets of figures are here correlated, *i.e.* there is a tendency for both readings for any one subject to be either high or low. Thus R. Lee appears to be a fast reader and takes a relatively short time in both tests, whereas T. Brown reads slowly both before and after taking alcohol. This means that the standard error of the difference cannot be estimated by the formula $SE_{(A-B)} = \sqrt{SE_A^2 + SE_B^2}$ since this would overestimate the standard error of the difference and would, therefore, underestimate the significance of any difference observed. The formula appropriate to this case is $SE_{(A-B)} = \sqrt{SE_A^2 + SE_B^2 - 2r SE_A SE_B}$, where r is the coefficient of correlation.

In practice there is no necessity to use this formula since the estimate of the significance of the mean difference can be made more simply by calculating the SE from the differences themselves. For example, in Table 4, the six differences show a mean of +4.5, the sum of squares of deviations from this mean is 29.5, the variance is $29.5/5 = 5.9$, and the standard error is $\sqrt{5.9/6} = 0.99$. The ratio of the mean difference to its own estimated standard error is 4.55, and this is a critical ratio obviously ample to prove the reality of the difference if these quantities had been calculated for a large sample. Even for such a small sample as six, we find on reference to the appropriate tables that this value of the critical ratio would only occur by the chances of sampling about once in a hundred times, so these figures would be sufficient to prove that the reading process was really slowed after taking alcohol.

This method of experimenting is more sensitive than that in which one compares an experimental group with a control group, since with the same number of observations one gets a difference with lower variance and therefore a lower standard error. It should therefore always be used when it is applicable. Sometimes one must use different subjects for the comparisons since a subject tested under the one condition cannot also be tested under the other, *e.g.* the same subject cannot be set to learn the same passage under two conditions of learning. When one is comparing natural groups, as, for example, in an experiment to compare the mathematical abilities of boys and girls, there is no way of getting rid of the necessity for two sets of observations from two separate groups. When, however, it is possible to use a single set of subjects under two sets of conditions, it is wasteful of time to use the relatively

insensitive method of two groups which will require many more observations in order to obtain equal precision of result

One may also ask in what circumstances can one safely conclude that there is no difference between two groups. The answer is fairly obviously that no comparison between the mean of two groups would enable one to draw this conclusion. If we found that the mean intelligence of a random sample of boys differed from that of a corresponding sample of girls by an amount much smaller than the standard error of this difference, the correct conclusion would be that this set of observations gave no ground for concluding that there was a sex difference in intelligence, not that it gave reason for concluding that there was no difference. One could go a little further than this and say that the difference, if any existed, was unlikely to be greater than an amount measured by twice the standard error of the difference. Since, by increasing the size of the samples, we could make this standard error as small as we pleased, this gives us in practice as definite an answer as we can want. We can prove that the difference, if any, does not exceed a known amount, which amount can be made as small as we wish.

6. Estimation of Significance from a Theoretical Variance

In some forms of experiment it is not necessary to calculate the standard error of the mean since the conditions of the experiment are such that its expected value if chance alone is operative can be calculated. Let us suppose, for example, that a pack of N cards in random order contains n different kinds all equally likely to occupy any particular position. Then if a subject guesses which of the n cards occupies each position in the pack, the chance of him being right in any particular case is $1/n$. The expected number he will get right in the whole pack if nothing but chance determines his right guesses is N/n . The chance that he will get 0 right, 1 right, 2 right, etc., are the successive terms of the series obtained by the expansion of the quantity $(p+q)^N$, where p is the chance that he will be right in any particular guess and q is the chance that he will be wrong in any particular guess, i.e. $q=(1-p)$. The standard deviation of this *logarithmic series* is known and is \sqrt{Npq} . Thus if, as in the parapsychological experiments of Rhine,²²⁸ there are five kinds of cards, the S.E. of a series of N guesses = $\sqrt{N \cdot 1/5 \cdot 4/5} = 2\sqrt{N/5}$ *

If, then, the question under investigation is as to whether the subject can guess more cards right than can be accounted for by

* That is, if the condition is fulfilled that the order is wholly random. If there are only five cards of each kind in each pack and the subject's guesses are also equally distributed S.E. = $2.04\sqrt{N/5}$

chance alone, it is quite correct to use the standard error based on this theoretical variance even though the observed variance will be greater than this if the subject is succeeding in the task. The question at issue is whether the results are due to chance alone, and to test this hypothesis we assume the variance that would be due to chance. It would, on the other hand, be incorrect to use the theoretical variance if the problem were, let us say, whether he succeeded in this task better after taking coffee. We should then have two series of figures, one obtained with and one without coffee, neither of which can be assumed to be a chance series, and in order to discover whether any difference between them was significant it would be necessary either to calculate the observed variances by summing squares of deviations as described earlier or else to calculate a theoretical variance from the actual proportions of successes and failures in both tasks by the subject and to use the formula \sqrt{Npq} , with p standing for the actual proportion of successes and q for the actual proportion of failures.

The problem discussed in the second section of this chapter (of proof of the ability to discriminate between butter and margarine) could in a long series of mixed successes and failures be treated by the method of calculating a standard error from a theoretical variance. In this case the expectation of being right by chance alone in a single trial is $1/2$ and the expectation of being wrong by chance is also $1/2$. So the variance of the deviation from expectation in N trials is $N \cdot \frac{1}{2} \cdot \frac{1}{2} = N/4$, and the standard error for N trials is $\sqrt{N}/2$. A deviation can therefore be regarded as just significant if it exceeds twice this value, i.e. if it is greater than \sqrt{N} .

It will be seen that there may be more than one way of estimating the significance of a given result. When alternative methods are both appropriate and both efficient (i.e. making full use of the information obtained) they will lead to approximately the same result, and choice between them is determined by convenience. For example, the same data may sometimes be treated by a standard error calculated from the observed variance, or from the theoretical variance. There will be little difference in the estimate of significance, but the first method will take longer.

7. The Use of Contingency Tables

A common form of statistical problem in psychological investigations is that found in a *contingency table*. This is a table showing the numbers of individuals who fall into certain classes, and the problem is to discover whether these numbers indicate any departure from a random distribution. For example, the following table shows the number of children evacuated during the 1939 war

from Tottenham to Cambridge who were, and the number who were not, satisfactorily adjusted to their foster homes at three different age ranges —¹¹⁰

AGE RANGE	SATISFACTORY ADJUSTMENT	UNSATISFACTORY ADJUSTMENT	TOTAL
5—8	43	1	44
8—12	105	2	107
12—16	118	22	140
Totals	266	25	291

Table 5 —Contingency Table showing variation of adjustment to foster homes amongst evacuated children of different age groups

The problem raised by this table is as to whether there is a tendency for the proportion of unsatisfactorily adjusted children to be different at different age levels or whether the quantities in the cells are consistent with the *null hypothesis* that any variation in the observed proportions of the different groups is only such as might be due to the chances of sampling. The obvious indication of the table is that the oldest group of children are more likely to be unsatisfactorily adjusted, as is apparent if we express the results as percentages —

AGE RANGE	SATISFACTORY ADJUSTMENT	UNSATISFACTORY ADJUSTMENT
5—8	97.7%	2.3%
8—12	98.3%	1.7%
12—16	84.5%	15.5%

Table 6 —Percentage of successes and failures of adjustment to foster homes in different age groups

This expression as percentages makes clear the general indication of the table which is not clear in its original form. It is therefore a useful device for displaying the apparent tendency of observations. It does not, however, enable us to discover how likely is the observed deviation from expectation to arise by chance. Percentage results of this kind should therefore never be presented without the original figures from which the percentages were calculated.

For determining the significance of the apparent difficulty in adjustment of the oldest group, the next step is to calculate how many would be expected in each cell if there were the same proportion in each age group. This will obviously be found by filling in for each cell the values which have the same proportion as the two column totals and which add up to the observed row total.

Thus for the age range 5-8 these values will be $(44 \times 266)/291 = 40.2$ for satisfactory, and $(44 \times 25)/291 = 3.8$ for unsatisfactory adjustment. The whole table of expected values is shown in Table 7. The figures in brackets show the amounts by which the observed values differ from the expected values.

AGE RANGE	SATISFACTORY ADJUSTMENT	UNSATISFACTORY ADJUSTMENT	TOTAL
5—8	40.2 (+ 2.8)	3.8 (— 2.8)	44
8—12	97.8 (+ 7.2)	9.2 (— 7.2)	107
12—16	128.0 (— 10.0)	12.0 (+ 10.0)	140
Totals	266	25	291

Table 7—Expected values of numbers of satisfactory adjustments at different ages on the hypothesis that the proportions are the same for all age groups

In order to discover whether there is a real difference in satisfactoriness of adjustment between different age groups, we must calculate a quantity called χ^2 (*chi*²). The method is as follows. Let $(m+x)$ be the number of cases actually observed in any class, and m the number expected on some hypothesis to be tested (such as the hypothesis of chance distribution). Then $\chi^2 = \sum (\chi^2/m)$, i.e. x^2/m summed for all the classes. The greater χ^2 is found to be, the greater is the significance of an observed deviation from the proportions expected. In the present case, χ^2 is $2.8^2/40.2 + 2.8^2/3.8 + 7.2^2/97.8 + 7.2^2/9.2 + 10^2/128 + 10^2/12.0 = 17.6$. In order to estimate the significance of this deviation from expectation, we must know one other fact about the data—the number of degrees of freedom of the classes. This is the number of the classes whose amount could have varied independently (generally indicated by n)*. In the case of the above table, the number of degrees of

* The number of degrees of freedom is the number of a set of quantities which can be independently varied without affecting the values of any parameters which have been calculated from them. A parameter is any quantity which specifies the characteristics of a set of figures, such as a mean, a total, a measure of scatter, etc. In the case of this table, two of the entries might have had different values but, if the marginal totals are to remain the same, the remaining four entries would have been fully determined. For example, the number satisfactorily adjusted in the first two age groups might have been 40 and 100, but then the remaining entries must have been 126, 4, 7, and 14 if the marginal totals were to remain the same. The number of degrees of freedom in a contingency table with m rows and n columns is $(m-1)(n-1)$. Another way of getting the number of degrees of freedom is that it is the total number of quantities in the set minus the number of independent parameters calculated from them. In this case, there are six quantities and six parameters have been calculated from them (the five marginal totals and the grand total). But of these six parameters only four are independent since if four marginal totals were known, the remaining marginal total and the grand total could be deduced from them. So by this method we get the same value for the degrees of freedom in the table $6 - 4 = 2$.

freedom is two. Looking up in mathematical tables of χ^2 , the probability of the occurrence by chance of various values of χ^2 when $n=2$, we find that $P=0.001$ for $\chi^2=13.8$. Thus the odds are better than 1,000 to 1 against such a deviation from expectation having arisen by the chances of sampling, and the data can be taken to give adequate evidence that there is really a greater difficulty for the oldest group of children to settle down in a foster home.

Contingency tables may contain any number of rows and of columns. The significance of departures from expectation are dealt with in all cases by the application of the same rules. A contingency table with a large number of rows and columns can be reduced in size by grouping some of the rows or some of the columns together, and it is sometimes advisable to do this if it does not obscure the directions in which departures from expectation occur. It is always advisable to do such grouping if otherwise the expectation in any cell is very small (*i.e.* less than about 3).

A very common form of contingency table is that of the four-fold table in which there are two rows and two columns so the number of degrees of freedom is one. The four groups may, for example, be the successes and failures in an experimental group and those in a control group, or the number of boys achieving and failing in a certain task and the number of girls achieving and failing in the same task. The method of calculating χ^2 is essentially the same as that used above, but, in all cases of one degree of freedom, it is advisable to use a correction known as *Yates's correction* in calculating χ^2 , since otherwise the value of χ^2 and therefore the significance of any departure from expectation is exaggerated by the fact that the cell entries can only vary by whole units. To make this correction, the quantity squared for calculating χ^2 is not the departure from expectation (x) but half a unit less than this. In other words, χ^2 is calculated as $\sum(x - \frac{1}{2})^2/m$ instead of as $\sum x^2/m$. For one degree of freedom, the values of χ^2 for the $P=0.05$, $P=0.02$, and $P=0.01$ levels of significance are respectively 3.84, 5.41, and 6.64.

This correction is also made in the still simpler case where there are only two entries of observations to be compared with expectation, for example, in the problem given on pages 310 ff., where a subject discriminated butter from margarine correctly 12 times in 16 trials. On the hypothesis that he had no power of discrimination, we should have expected him to be right 8 times and wrong 8 times. The result can be written as in Table 8.

For Table 8, χ^2 (with Yates's correction) is $(3\frac{1}{2})^2 \times (\frac{1}{8} + \frac{1}{8}) = 3.06$. This is below the minimum level of significance for χ^2 with one

	SUCCESS	FAILURE	TOTAL
Observed	12	4	16
Expected	8	8	16
Deviation	+ 4	- 4	

Table 8

degree of freedom, so it is not good enough evidence that the subject is able to make the discrimination

CHAPTER XXI

THE METHOD OF CORRELATION AND THE ANALYSIS OF VARIANCE

1. Correlation

A common type of problem in applied psychology is whether in a group of individuals one measurable quality tends to be accompanied by another, whether, for example, success in a school examination in arithmetic tends to be accompanied by success in a school examination in Latin. The degree of correspondence (called the *correlation*) between the scores in two such examinations may be calculated in the following way. The means and the sums of squares of the deviations from the mean of the two sets of marks are determined and also the sum of the products obtained by multiplying each individual's deviation from the mean of his score for one examination by his deviation from the mean for the other examination. A deviation will be negative if the subject has less than the mean score and positive if he has more than the mean score, so that the product also may be either positive or negative. To obtain the *coefficient of correlation*, the sum of these products is divided by the square root of the product of the two sums of squares of deviations of the scores from their means. Using the symbols x for the deviations from its mean of the scores of one test and y for the deviations from its mean of the scores of the second test, the correlation coefficient (r) can be written as $\Sigma xy / \sqrt{(\Sigma x^2 \Sigma y^2)}$ *

If there is no correlation between the two scores, so that success in the one examination or test is no indication at all of probable success in the other, Σxy will be approximately zero, since there will be, within the limits of chance deviation, the same number of negative as of positive values of xy . The coefficient r will therefore also be about zero. If, on the other hand, there is complete agreement between the two sets of scores, Σxy will have a maximum value and will in fact be equal to the quantity $\sqrt{(\Sigma x^2 \Sigma y^2)}$ which is the denominator of the fraction expressing the correlation coefficient, so this will have the value $+1$. If success in the one test

* This is the Bravais-Pearson formula which is most generally used. Spearman has also devised a rank-difference formula which can be used for data in which we have no scores but can only rank our subjects in order of merit. This has also the advantage of being somewhat more easily calculated when the number of subjects is not large. On the whole, the Bravais-Pearson formula is to be preferred when it can be used.

were accompanied by an equal degree of failure in the other, r would be -1 . We find in practice that nearly all of the abilities which we measure in examinations or mental tests are more or less correlated with one another, but complete correlation is, of course, rare, so the values of r actually found lie generally between 0 and $+1$.

We may take as an example the scores of twelve students in two learning tasks in which each student learned one passage of prose by the active method of attempting reproduction between each repetition of the passage and another passage of prose by a passive method in which he learned without any attempt to reproduce until the test at the end. The problem is to discover whether there is any correlation between these two tasks, *i.e.* whether some students tend to do badly while others tend to do well in both tasks.

SUBJECT	ACTIVE LEARNING SCORE	DEVN FROM 10 (x)	PASSIVE LEARNING SCORE	DEVN FROM 10 (y)	x^2	y^2	xy
A S	10	0	14	+ 4	0	16	0
M N B	12	+ 2	12	+ 2	4	4	+ 4
L M	$9\frac{1}{2}$	$-\frac{1}{2}$	12	+ 2	$\frac{1}{4}$	4	$-\frac{1}{2}$
R S T	8	- 2	13	+ 3	4	9	- 6
V D	11	+ 1	9	- 1	1	1	- 1
M G	12	+ 2	14	+ 4	4	16	+ 8
D D	8	- 2	7	- 3	4	9	+ 6
W T	$14\frac{1}{2}$	$+ 4\frac{1}{2}$	$12\frac{1}{2}$	$+ 2\frac{1}{2}$	$20\frac{1}{4}$	$6\frac{1}{4}$	$+ 11\frac{1}{2}$
D A	8	- 2	9	- 1	4	1	+ 2
P G G	7	- 3	9	- 1	9	1	+ 3
C C	9	- 1	12	+ 2	1	4	- 2
D B	12	+ 2	13	+ 3	4	9	+ 6
N = 12							
Totals	121	+ 1	$136\frac{1}{2}$	$+ 16\frac{1}{2}$	55.5	80.25	+ 30.25
Means	10.83		11.38				
Corrections for assumed mean					- .08	- 22.69	- 1.38
True values of Σs					55.42	57.56	+ 28.87
Correlation coefficient (r) = $28.87/\sqrt{(55.42 \times 57.56)} = + 0.51$							

Table 9—Calculation of coefficient of correlation between two learning tasks

Nothing can, of course, be concluded as to the relative merits of the two methods of learning from the fact that the mean score for active learning is 10.83 and that for passive learning is 11.38. Even if this difference were significant it might be explained by the passage used for passive learning being easier than that for active learning, as was in fact the case. The question here is as to whether a particular individual's score tends to be good or bad

in both tasks. Examination of the figures suggests that it is so, e.g. W T and D B do well in both tasks whereas D D, D A, and P G G do badly in both. Whether this apparent relation is a real one, however, can only be determined by a calculation of the coefficient of correlation and determination of its significance.

The quantities required for this determination are Σx^2 , Σy^2 and Σxy where x and y are the deviations of the two scores from their own mean. These quantities could have been calculated by making a list of deviations from the mean and squaring these and also finding their products. As was pointed out, however, in calculating the standard deviation, this is unnecessarily laborious since it involves calculating to several places of decimals. Time is saved by making the original deviations from some convenient central value (in this case 10) and then making a correction at the end. The correction to be made to each sum of squares is the subtraction from it of the square of the difference between the true mean and the assumed mean multiplied by N (the total number of cases). The correction to be applied to the sum of the products is N times the product of the difference between the assumed mean and the true mean for each test. The correction in this case is $-12(10.83 - 10)$ $(11.38 - 10)$. This will come to a negative quantity and must therefore be subtracted if both true means are larger or both smaller than the assumed means, it must be added if one of the true means is larger than the assumed mean while the other is smaller. Here the correction is -1.38 . Substituting the corrected values of $\Sigma x^2 = 55.42$, $\Sigma y^2 = 57.57$, and $\Sigma xy = +28.87$ in the formula for the correlation coefficient we find $r = +.51$.

This is not yet sufficient evidence that the two performances tend to vary together, it is also necessary to establish that the correlation coefficient is significant. Unless the coefficient is of such a size that it could not have been produced more than once in twenty times by the chances of sampling it cannot be taken as evidence of a real tendency to correlation. There has been some discussion as to the right way of estimating the significance of a correlation coefficient particularly that obtained from a small sample. The formula generally given for it is

$$SE = (1 - r^2) / \sqrt{N - 1}$$

where N is the number of pairs. It has been pointed out by Fisher that this formula overestimates the significance, particularly when r has been calculated from a small number of pairs⁸⁶. Tippett has suggested that since, in estimating significance, we are asking whether an observed value of r is consistent with the true value of r being zero, we should substitute 0 for r in the above formula

Then $SE = 1/\sqrt{N-1}$. This formula agrees sufficiently well with the estimates of the significance of r given in Fisher's Tables⁸⁷ when the number of pairs is not less than about thirty. For smaller samples, it somewhat underestimates significance.

In the present case, we have used only a small sample of twelve pairs. Use of the above formula gives a SE of .30, so the coefficient is less than twice its standard error and cannot be judged significant. Reference to Fisher's Table shows that with this number of pairs a correlation coefficient must be at least .576 for the $P=.05$ level of significance. We cannot, therefore, safely draw any conclusion from these figures as to whether some individuals tend to do well and others to do badly on both tests. In general, a considerably larger sample than twelve pairs is necessary to establish a correlation.

2. Partial Correlation

A significant correlation between two abilities indicates the degree to which one ability in any individual tends to be accompanied by the other. The real question of theoretical interest is, however, the causal relationships which this correlation indicates. Care is needed in order to avoid jumping to unwarrantable conclusions as to cause and effect. Let us suppose, for example, that we wish to find out whether there is any truth in the claim that the learning of Latin improves reasoning power. We give to all the boys in a school a test of Latin and a test of reasoning power and find a large correlation, and assert therefore that learning Latin improves reasoning—quite unjustifiably. In the first place we have failed to notice that the boys in the top classes have learned more Latin and also, having had more schooling and practice in all reasoning operations, have done better in the reasoning test. The third factor is here school standing. To eliminate the effect of this we test only boys of one class and we still find a correlation although now it is smaller. Still the obvious conclusion is not justified. The more intelligent boys have done better in the Latin test and also in the reasoning test. If we could have got a sufficiently large sample of boys of equal intelligence and of the same school standing, we should perhaps have found no correlation.

We can express this in a general form by saying that two abilities A and B which would be uncorrelated in a population homogeneous with respect to a character C , may appear to be correlated with one another when tested in a population heterogeneous with respect to C , if A and B are themselves both correlated with C . If, on the other hand, A and B are correlated even in a population

homogeneous with respect to C , the numerical value of the correlation in a population heterogeneous with respect to C will in general be affected by the fact that either A or B is correlated with C . This effect may either be to increase or to decrease the apparent correlation of A and B . For many purposes it is necessary to know what would be the correlation between A and B if it were not affected by C .

The obvious way of determining this is to make the group tested homogeneous with respect to C (in the above examples, to have all the cases tested of the same age, school standing, and intelligence). This, however, is often impracticable since it may be impossible to get a sufficiently large sample fulfilling the required condition. The same end may then be attained by the use of a formula for eliminating the effect of partial correlations, *i.e.* the correlations of A and B with C . If r_{AB} is the observed correlation between A and B , the value $r_{AB(C)}$ which it would have in a population homogeneous with respect to C is given by the formula

$$r_{AB(C)} = (r_{AB} - r_{AC} r_{BC}) / \sqrt{(1 - r_{AC}^2)(1 - r_{BC}^2)}$$

This is very generally called the correlation between A and B with C held constant. It should be noted, however, that this formula cannot be legitimately used without correction unless we have measurements of C which are not appreciably affected by errors of measurement.²⁸³

3. Analysis of Variance

Working out a correlation coefficient is a particular example of a more general problem. Let us suppose that we are working out a correlation coefficient between the intelligence quotients of the oldest and second child of a number of families. We can regard the correlation coefficient as telling us how far the pairs of siblings resemble each other more with respect to intelligence than they resemble members of other families. In other words, it tells us how far different pairs differ in intelligence from each other more than do members of the same pair. That is, we are comparing the variance between pairs with the variance within pairs. If members of the same family differed from each other as much as they did from members of other families, then the correlation would be zero, if they did not differ from each other at all while pairs from different families did differ, then the correlation would be +1.

Exactly the same question could be asked about any number of siblings. Let us suppose that from a number of families we

measured the intelligence quotients of the first five children. Then we might find some such values as are shown in Table 10.

FAMILY	FIRST CHILD	SECOND CHILD	THIRD CHILD	FOURTH CHILD	FIFTH CHILD	MEAN
Smith	101	125	118	136	120	120
Brown	82	91	107	75	60	83
Jones	135	98	146	112	104	119
Davies, etc	103	109	94	114	90	102

Table 10

The problem here is to determine whether there is a tendency for all entries in the same row to resemble each other more closely than do entries in different rows. If they do to a significant extent, this is evidence that members of the same family tend to resemble each other in intelligence. One might, of course, also ask whether the entries in the same column tended to resemble each other. If they did, it would indicate that intelligence depended to some extent on position in the family.

The method of solving this problem depends on a comparison of the scatter between the means for each family with its expected value on the hypothesis that there was no tendency for members of the same family to resemble one another. It is obvious that the more closely members of the same family resemble each other, the larger will be the variance of the means of the families, for then any difference from the general mean that any one member of a family may have will also be found more or less in other members of the same family, so the characteristic value for all members of the family will be acting in the same direction to produce a similar characteristic value for the mean of that family. On the other hand, if there is no tendency for members of the same family to resemble each other, some members of a family may be of high intelligence while others are low and their differences will tend to cancel each other out, so producing a tendency for the means of different families to resemble each other. The means for different families will not then all be identical, they will have a relatively small variance due to the chances of sampling. The expected value of this variance of the family means if there is no resemblance between families can be calculated from the principle of additiveness of variances of uncorrelated variates. It follows from this principle that the variance of the row totals will be about five times the variance inside the rows (*i.e.* between members of the same family). When we divide the row totals by five to get the row

means, we reduce the variance by $1/25$. The expected variance of the means of the rows is, therefore, $1/5$ the mean variance within the rows. If it significantly exceeds this amount there must be present some cause making the values within each row (*i.e.* the intelligence quotients of members of the same family) resemble each other more closely than do those not in the same row. This is the essential principle underlying the method of analysis of variance.

It is a method well adapted to many of the problems one meets in psychological research. In addition to the one already mentioned, there are, for example, the following: (1) Are there real individual differences with respect to some measurable psychological quality? Each row will then contain the measurements for one individual, and different rows will be those for different individuals. (2) Are there day-to-day fluctuations in some measurable psychological characteristic (*e.g.* in intelligence or some trait of personality)? Each row will contain measurements obtained on one occasion while different rows will contain measurements of the same characteristic for the same individual on different occasions.

In order to illustrate the methods of computation, I have shown in Table 11 results obtained in an experiment on size perception on five individuals. A square disc of 23.8 cm diagonal was placed on a table before the subject. A variable disc at one-half the distance of the other was adjusted until the subject reported that their apparent sizes were the same. The readings were the diagonal size of the variable disc when the subject reported that they looked equal. The problem is as to whether there are real individual differences between the points of apparent equality for different subjects.

SUBJECT	READINGS				MEAN	Σ SQUARES OF DEVIATION FROM MEAN	VARIANCE
	(1)	(2)	(3)	(4)			
O L Z	23.0	23.1	23.6	23.6	23.325	0.31	0.103
F C B	20.6	20.8	20.9	21.5	20.95	0.45	0.150
E G C	20.0	20.2	20.5	20.8	20.375	0.37	0.123
J T M	24.1	24.0	24.1	24.1	24.075	0.01	0.003
M V	22.6	22.6	23.0	23.9	23.025	1.13	0.377
General Mean					22.35	2.27	Mean V = 0.151

Σ Squares of deviations of row means from general mean 10.24
Variance of row means $10.24/4 = 2.56$

Table 11—Analysis of variance of 4 applications of the same experiment to each of 5 subjects

The last column but one of this table (11) shows the sum of the squares of the deviation of each entry in the row from the mean of that row. The last column shows the variance of each row as obtained by dividing this sum by the number of degrees of freedom, that is, by 3. The variance of the row means is similarly obtained by summing the squares of the deviation of each row mean from their general mean and dividing by their number of degrees of freedom which is one less than the number of rows, *i.e.* 4.

Although these steps are shown as a guide to the aim of the analysis, they need not all be taken in actual computation since time can be saved by taking suitable short cuts. It is not, for example, necessary to calculate the variance for each row separately since numerically the same result can be obtained by summing the squares of deviation from the row means and dividing this sum by the total number of degrees of freedom in the rows, *i.e.* $2.27/15 = 0.151$. Nor is it necessary to calculate directly the deviations of entries from the row means since simple algebra shows that precisely the same result can be obtained by summing the squares of the deviations of each of the twenty results from the general mean (which in this case gives 43.23) and subtracting from this the sum of the squares of deviations of row means from the general mean multiplied by the number in each row which in this case is 40.96. We then get $(43.23 - 40.96) = 2.27$ which is identical with the value obtained with more labour by summing the squares of deviations from each row mean.

An estimation of the tendency of the row entries to agree amongst themselves requires a comparison of this mean variance within rows with the variance of row totals. The variance of row totals is calculated by summing the squares of the deviations of row means from their general mean (22.35). The Σ squares so obtained is divided by the number of degrees of freedom (one less than the number of rows) to give the variance of 2.56. The results are displayed as follows (Table 12).

	DEGREES OF FREEDOM	Σ SQUARES OF DEVIATION	VARIANCE	VARIANCE RATIO	P
Within rows	15	2.27	0.151		
Between rows	4	40.96 (4 \times 10.24)	10.24	67.8	< 0.001
Total	19	43.23			

Table 12—Results of analysis of variance of data in Table 13 (Method I)

If there is no tendency for the scores of the same individual to resemble each other more than the scores of different individuals,

the two variances in the third column will be about the same, that is, they will not differ significantly*. The most convenient way of testing their significance is to work out their ratio (67.8) and to compare it with the values given for different levels of significance in Fisher and Yates tables⁸⁷. Here we find that if n_1 (the number of degrees of freedom of the larger variance) is 4, while n_2 (the degrees of freedom of the smaller variance) is 15, a variance ratio of 8.25 would be significant at the level $P=0.01$. The observed variance ratio is very much greater than this, so the figures provide adequate evidence of a real tendency for the scores obtained by each subject to resemble other scores by himself more than they resemble scores by another subject. Indeed the self-consistency of these measurements is unusually high corresponding to a correlation coefficient of 0.985.

It may be convenient at this stage to show the first three columns of this table in more general form. This is done in Table 15, where the symbol p is used for the number of rows, q for the number of entries in each row, \bar{r} for the row means, λ for the separate scores, and \bar{x} for the general mean. We then have

	DEGREES OF FREEDOM	Σ SQUARES OF DEVIATIONS	VARIANCE
Within rows	$p(q-1)$	$\Sigma (\lambda - \bar{r})^2$ $= \Sigma (x - \bar{x})^2 - q \Sigma (\bar{r} - \bar{x})^2$	$\Sigma (\lambda - \bar{r})^2 / p(q-1)$
Between rows	$p-1$	$q \Sigma (\bar{r} - \bar{x})^2$	$q \Sigma (\bar{r} - \bar{x})^2 / (p-1)$
Total	$pq-1$	$\Sigma (\lambda - \bar{x})^2$	

Table 13—General form of Table 12 (Method I)

The entries in Tables 12 and 13 may be looked at in another way which will be found useful as an aid to understanding the less simple applications of the method which will be considered later. The quantity $q \Sigma (\bar{r} - \bar{x})^2$ in the second row of Table 15 may be understood as the contribution of the differences between rows to the total Σ squares. It is the value that the total sum of squares would have if all entries in any one row were the same, and the only source of difference between the original measurements were this difference between the row means. In practice, we always

* Note that the "between rows" variance is the sum of squares of deviations of the row means multiplied by the number of entries in each row and divided by one less than the number of rows. It is only a result of the fact that in this particular case, these two numbers are both four that this quantity happens to be the same as the sum of squares of deviations of row means.

find the total Σ squares larger than this contribution of the differences between rows because there are other causes making differences between different entries as well as those causes (if any) which act differently on different rows. The contribution to the total sum of squares made by these other causes is found by subtracting $q \Sigma (t - \bar{t})^2$ from the total sum of squares $\Sigma (x - \bar{x})^2$. If this quantity is divided by the number of its degrees of freedom that is by the total number of degrees of freedom of the table $(pq - 1)$ minus the number of degrees of freedom of the row means $(p - 1)$, i.e. if it is divided by $(pq - p)$, the amount so obtained may be called the *remainder variance*, or *error variance*. This is identical with what we have earlier called the variance within rows.

If there were no causes acting differently on different rows, the quantity obtained by dividing the contribution of row differences to the total sum of squares by the number of degrees of freedom between rows, i.e. $q \Sigma (t - \bar{t})^2 / (p - 1)$, which we will call the *row variance*, would be about equal to the remainder variance. This can easily be proved from the principle that when we add uncorrelated quantities their variances are also added, since it follows from this principle that the variance of row totals will be q times the remainder variance and the variance of row means will be $1/q$ times the remainder variance (because dividing the row totals by q results in dividing the variance by q^2). It follows that evidence for the presence of causal factors acting differently on different rows is that the row variance is significantly greater than the remainder variance.

Parallel reasoning enables us to answer the further question as to whether entries in the same column of our tables show a tendency to resemble one another. We note that in Table 13 the means of the columns are 22.06, 22.14, 22.42, and 22.78. It looks as if the responses of the subjects depended partly on the serial order of the successive applications of the test, tending on the average to get greater in later applications. Is this a consistent tendency or can these differences between column means be attributed merely to the chances of sampling? The presence of causes tending to make entries in the same column resemble each other can be revealed in the same way as was used for discovering whether there was a real tendency for entries in the same column to resemble one another, by calculating the column variance and comparing it with the error variance. Now, however, the error variance must be calculated by subtracting from the total sum of squares both the contribution to the sum of squares from the row differences and that from the column differences, and dividing the

result by the number of remaining degrees of freedom which is the total number of degrees of freedom minus both the number of degrees of freedom between rows and that between columns that is, by $19 - 4 - 3 = 12$

The sum of squares of column differences is found to be 318. Multiplying this by the number of entries in each column (5), we get 1.59 as the contribution of column differences to the total sum of squares. Since the number of degrees of freedom between columns is 3 (1 less than the total number of columns), the column variance is .53. The contribution of row differences to the total Σ squares is 40.96, as before, so the remainder variance is $(43.23 - 40.96 - 1.59)/12 = .057$. This is a measure of that part of the scatter between the test measurements which is due to causes other than those making the results of different individuals vary or those making the measurements on different occasions vary. If there were no real tendency for change of the measurements on successive occasions, we should expect the column variance to be about the same as this remainder variance.

Table 16 shows the results of this analysis of the figures

	DEGREE OF FREEDOM	Σ SQUARES OF DEVIATIONS	VARIANCE	VARIANCE RATIO	P
Between rows	4	40.96	10.24	$10.24/.057 = 180$	< 0.001
Between columns	3	1.59	.53	$0.53/.057 = 9.3$	< 0.01
Remainder	12	0.68	.057		
Total	19	43.23			

Table 14 — Analysis of variance of data in Table 11 (Method II)

We see that the column variance is nearly ten times as large as the remaining error variance and, testing the significance of this variance ratio of 9.3 by means of Fisher and Yates tables, we find that for $n_1 = 3$ and $n_2 = 12$, the variance ratio must be at least 5.95 for the level of significance indicated by $P = .01$, and at least 10.8 for $P = .001$. The observed value lies between these amounts and is significant. So we can conclude that the indicated tendency for subjects to change their adjustments at successive applications of the test is a real one.

The general formula for this method of analysis is shown in Table 17 where the same symbolism is used as that of Table 14 with the addition of c for members of the class of column means.

It will be clear from what has been said that the Σ squares in the first, second, and fourth rows of this table are computed from

	DEGREE OF FREEDOM	Σ SQUARES OF DEVIATIONS	VARIANCE
Between rows	$p - 1$	$q \Sigma (r - \bar{r})^2$	$\frac{q \Sigma (r - \bar{r})^2}{p - 1}$
Between columns	$q - 1$	$p \Sigma (c - \bar{c})^2$	$\frac{p \Sigma (c - \bar{c})^2}{q - 1}$
Remainder	$(p - 1)(q - 1)$	$\Sigma (x - \bar{x})^2 - q \Sigma (r - \bar{r})^2 - p \Sigma (c - \bar{c})^2$	$\frac{\Sigma (x - \bar{x})^2 - q \Sigma (r - \bar{r})^2 - p \Sigma (c - \bar{c})^2}{(p - 1)(q - 1)}$
Total	$pq - 1$	$\Sigma (x - \bar{x})^2$	

Table 15—General form of analysis of variance (Method II)

the data, while that in the third row is found by subtracting these of the first and second rows from the Σ squares of the fourth row. If there is no cause at work making the row entries resemble each other more than entries in different rows, the variance of the first row will be not significantly different from that of the third row and the evidence of such a tendency will be that the ratio of the between row variance to the remainder variance is significantly greater than unity. Similarly for the column variance.

In considering whether the simpler method first described is appropriate for a particular enquiry or whether it is necessary to adopt the second method, it must be borne in mind that in some cases there would obviously be no sense in looking for a tendency for the column entries to vary together since there is nothing in common between entries belonging to the same column. This would be so, for example, if the four row entries referred, let us say, to the intelligence quotients of quadruplets, since obviously the entries of each row could have been written in any order we please. It would also be the case if the row entries referred to the scores in some single test obtained by four individuals selected at random from the same population (different rows being samples from different populations). The first row might, for example, be four or more English schoolboys, the second the same number of Chinese schoolboys, the third of Indians and so on, in an investigation to find out whether there were race differences in intelligence or some other measurable psychological characteristic. In all such cases, Method I would be the only appropriate method of analysis of variance.

When, however, all members of one column have some characteristic in common, row entries being, for example, successive applications of a test, or first, second, and third children in a family, Method II is the appropriate method of analysis. It has the advantage not

only of giving additional information (as to how far the common characteristic of the column affect the variance) but also it gives a more exact estimate of the significance of the row variance. If the characteristic of the column affect the variance) but also it gives a bution to the variance, the row variance ratio is of course about the same by both methods, although its significance is somewhat reduced in Method II by the smaller number of degrees of freedom in the remainder variance. If, however, the column differences are making a considerable contribution to the variance, the significance of the row variance ratio is likely to be considerably greater by Method II, and it is greater because more correctly estimated. For example, by Method II in Table 14 above, the row variance ratio has more than doubled whereas the change from fifteen to twelve in the number of degrees of freedom of the variance with which it is compared increases the variance ratio required for the $P = .001$ level of significance only from 8.25 to 9.63.

More complex problems in the analysis of variance arise when more than two sets of causes producing variance may be investigated in the data. One might, for example, have a set of test results obtained from a group of subjects, the order in which the tests were given being varied. One could then ask how much of the difference in results was to be attributed to differences between the subjects, how much to differences between the tests, and how much to the order in which the tests were administered. One could also ask how much of the difference was due to the different effect of order changes on different tests. The principles underlying these more complex analyses of variance are similar in principle to those already described, but details must be found in textbooks on statistics.

The method of analysis of variance is basically simple although it is difficult to grasp by merely reading about it. The best way of gaining insight into it, as in most statistical insights, is by using the instructions as a guide to working out a few examples oneself. When this insight has been acquired, the experimental psychologist has acquired a useful new research technique. For those problems to which it can be applied, it is preferable to the use of the correlation technique with only two columns of figures since the use of more columns than two results in a very considerable economy. In order to obtain a significant correlation coefficient between two sets of variates it is generally necessary to obtain measurements for a large number of pairs since the standard error of the correlation coefficient is large. More significant indication of inter-correlation can be obtained from a smaller number of cases when a table of four or five columns is treated by the method of analysis

of variance. For example, if one wanted to find out whether members of the same family resembled one another in intelligence, a more sensitive test of this resemblance would be provided by taking five members each of twenty families than by taking pairs of siblings from fifty families although the testing work would be identical in the two cases. It not infrequently happens that investigators have a table of four or five columns, and instead of treating it by the method of analysis of variance, they work out all correlation coefficients of all the pairs of columns. This method maximises labour and insensitivity. On the other hand the analysis of variance only gives information about the causal interrelations of the many columned table as a whole. If we want to know what part of any tendency to intercorrelation is contributed by any two columns, the ordinary correlation coefficient must be used.

CHAPTER XXII

MENTAL TESTING

1. Individual Psychology

Individual psychology is the study of the mental differences between individuals * The fact that scientific methods can be used for studying individual differences as well as for studying the uniformities of different individuals was a fairly late discovery in the history of psychology The foundation stone of the study of individual psychology was laid by Sir Francis Galton when he began to study the differences in different persons' imagery ^{1,2} Since that time, however, individual psychology has assumed an importance which, on its practical side at least, is hardly less than that of general psychology

The instrument used for the investigation of individual differences is known as the *mental test* A mental test differs from a research experiment in psychology by the fact that, while its material and actual method of working may be the same, it is carried out with a totally different aim In a quantitative research experiment a number of individuals are taken, and some function is measured in order to discover what is its average value, and, possibly, how its different values are distributed Exactly the same measurement may be carried out in a mental test, but then the average value of the function is supposed to be known, and the object of our measurement is to find out whether the individual examined displays that function in a higher or lower degree than the average individual and how much he is higher or lower

Thus the use of a mental test always necessitates previous experimental research on the same material It is first necessary to know what is the normal value of a mental function before we can find out whether a particular individual has that ability to a greater or lesser degree than is normal We must also obtain a measure of scatter for a large representative sample before we can give a satisfactory expression for the amount of a particular individual's deviation from the average This preliminary experimental work is called *establishing a norm* for the test It is generally the most arduous part of the work of devising a new test

* This term has also been appropriated by a school of mental therapy which has developed from psychoanalysis (that of Dr Adler of Vienna) ² The sense in which I am using the term individual psychology, is, however, that usually adopted

When the norm for a test has been established, the performance of a particular individual in that test will be expressed in terms of that norm. Merely to say that a given individual obtained a score of 56 in a particular test gives us almost no information, since we do not know whether this means that he did well or badly unless we know the scores of other people on that test. If we are told that the average for the population with which he is to be compared is 48, we know that he did better than the average, but we are still unable to tell how much better unless we are also told something of the scatter of the scores in the rest of the population. If we are also told that the standard deviation for the whole population is 6, we have the information as to norms necessary to judge how well this particular individual has done in this test.

One device for representing the performance of a particular individual in relation to the norm is to express his score as his deviation (+ or -) from the mean of the population as a whole in terms of the standard deviation as unit. In other words, the mean for the population is subtracted from his score and the difference is divided by the standard deviation for the whole population. This is called the *standard score*. In this case it would be $(56 - 48)/6 = +1.33$. This is an appropriate measure of performance in cases where the scores through the whole population are normally distributed, that is, in accordance with Gauss's curve of error. This condition is generally sufficiently closely adhered to by test scores provided they are not too difficult or too easy for the population for which they are devised. If they are made either too difficult or too easy the distribution of scores is likely to be markedly asymmetrical and the standard score is then somewhat misleading.

If the distribution of test scores is appropriate for the use of the standard score, it is fully informative and gives a measure independent of any peculiarity of the test itself. The standard score of zero tells us that the individual is exactly average, one of +0.675 tells us that he would be about one-quarter of the way down in an order of merit, while the individual with a score of -0.675 would be three-quarters of the way down. A standard score of +2.0 would be good, such a score or better being found only on the average once in forty cases, while +2.5 or better would be very good and would be found only once in two hundred cases.

While fully informative to the psychologist accustomed to standard scores, these have the disadvantage of not being easily grasped by the average person. A method of expressing results relative to a norm more generally understandable, which has also

the advantage of being applicable to scores not symmetrically distributed, is Galton's device of the *percentile rank*. This is the position of the individual tested in an average group of one hundred people arranged in order of merit. Thus an average score lies between the percentile rank of 50 and of 51. Some tests have tables for transforming the scores into percentile ranks. Where norms are expressed in the form of a mean and standard deviation, standard scores can be calculated and converted into percentile ranks by making use of a table of normal deviates. Thus a standard score of +2 is found in a table of normal deviates to correspond to a deviation which will be equalled or exceeded in either direction once in twenty times. That is, one in twenty individuals in a normal distribution will have a standard score of either +2 or more or -2 or less. Therefore, one in forty will have a standard score of +2 or more. The percentile rank must therefore be the one which will include forty times as many individuals below that rank as the number which includes that individual or those better than him. The percentile rank is therefore $100/40$, *i.e.* it lies between 2 and 3. The percentile rank method, unlike the use of standard scores, is appropriate for scores whose distribution is asymmetrical.

When a psychological quality varies on the average directly with some other measurable quality such as age, a third device is possible. This is used in measuring intelligence, which, at any rate during the first fifteen years of life, increases with age. One can then express the child's intelligence by giving the average age at which a random group of children would be just as intelligent as this particular individual. This is called his *mental age*. Few psychological functions do show this simple variation with age, so this device is not of very general application. Its suitability even for norms of intelligence is limited by the fact that intelligence does not continue to vary with age after fifteen, so fictitious mental ages have to be devised if mental age is to have a meaning beyond this point. These will be described later.

The purpose of a mental test is to measure in a given individual the amount of some mental function, such as an ability, which shows quantitative variation from one individual to another. Different things are measured in different kinds of test. The purpose of the test may be to measure some restricted mental function such as richness of mental imagery (Galton¹⁰²) or mechanical ability (Cox⁷⁶). It may be to measure some trait of personality, such as *perseveration* or *dominance*. It may, on the other hand, be intended to measure *general intellectual capacity* or *intelligence*. Not all kinds

intended to measure an ability. A test of such a personality trait as dominance, for example, is not designed to measure how well the subject *can* do something, but to measure how he *does* behave in one kind of situation. It is important to notice that the intelligence test is only one kind of ability test which must be distinguished from other kinds of test of ability. One sort of mechanical puzzle, for example, may be used as a performance test of general intelligence while a different sort of mechanical puzzle (one in which the difficulty lies in the operation itself and not in the intellectual processes necessary for carrying it out) may be used as a test of a special ability—mechanical ability. Both are mental tests and both are tests of ability, they are designed to find out how well the subject can do something. But only the first is an intelligence test.

Another kind of mental test is the *vocational test*, in which what is tested are the groups of mental functions which are of importance in a particular vocation. The earliest of these was Munsterberg's famous investigation of the capacities of different tram drivers by a test with a moving strip of paper which was designed to involve, as nearly as was possible under laboratory conditions, the same kinds of behaviour as were necessary to avoid traffic when driving a tram.

The general tendency of vocational testing since those early days has been away from such substitute laboratory tasks since it is found in practice that they do not always provide a satisfactory indication of the testee's ability in an apparently similar industrial task. Later development has been mainly in two directions: (i) the creation of a task in the laboratory as closely as possible duplicating the industrial operation itself, and (ii) the separate measurement of the capacities required for the industrial operation. The capacity to become a good tram driver may depend on various capacities which can be separately measured, such as general intelligence, visual acuity, speed of reaction, etc. The problem of determining what capacities enter into a particular operation and what capacities are measured by a particular system of tests is the concern of *multiple-factor analysis*, which will be discussed in the next chapter.

2. Reliability and Validity of Mental Tests

If any measuring instrument is applied twice to the same unvarying quantity and gives different measurements, the instrument is said to be unreliable. Most forms of physical measurement in everyday life, if carefully carried out, are sufficiently reliable for any difficulty introduced by possible unreliability to be safely

ignored. Mental tests are, however, not perfectly reliable. The test result obtained from each individual is an estimate vitiated to some extent by an error which may be great or small and which may either increase or decrease his score. These random errors will have the effect of reducing the correlation between two successive applications of the same test to the same group of people. This effect of test unreliability may be used for the purpose of assessing the reliability of a test. If the test were perfectly reliable and if it were certain that the ability to be measured did not vary from day to day, the correlation between two such applications of the test would be unity, as would be the correlation between two careful sets of measurements of the height of a group of persons. In fact, this *test-retest correlation*, or *self-correlation*, is always less than unity. If we assumed that the ability itself did not vary on different days, the degree of unreliability of the test could be satisfactorily measured by the extent to which the test-retest correlation fell short of unity. Since, however, we cannot be sure that this is the case, it is better to divide the test into two equivalent parts and to score these separately for each subject tested and then to determine the correlation between these two half-scores. This correlation does not itself give us the reliability of the whole test but of half the test, and the reliability of the whole test will always be greater than this. If r_{11} stands for the self-correlation of the whole test and $r_{\frac{1}{2}\frac{1}{2}}$ for the intercorrelation of the two halves of the test, we can determine the reliability of the whole test from the split-halves correlation by means of the formula $r_{11} = 2r_{\frac{1}{2}\frac{1}{2}}/(1 + r_{\frac{1}{2}\frac{1}{2}})$. Reliabilities of good intelligence tests range from about +0.9 to +0.95.

The fact that all mental tests are affected, to some degree by errors of measurement has a further effect. The measured correlation between the results of two tests A and B is always less than it would have been if the two tests had been completely reliable. This reduction of correlations is called *attenuation*.²⁵⁵ Each array of test results as actually obtained may be regarded as derived from the array that would have been obtained from a perfectly reliable test by every separate value having been given a random error. Since these errors are random, they will always reduce the amount of agreement of the array with any correlated array of values obtained from another test, just as they will reduce the correlation with a retest by means of the same test. It is possible to estimate the amount of reduction resulting from attenuation and thus to eliminate its effects if we have given to the same group of persons two repetitions of each of the two tests. If we use the symbols A_1 , A_2 , B_1 , and B_2 for the first and second repetitions of tests A

and B , an estimate of the unattenuated coefficient of correlation between A and B is given by the formula*

$$r_{AB} = \sqrt{(r_{A_1B_2} + r_{A_2B_1}) / \sqrt{(r_{A_1A_2} + r_{B_1B_2})}}$$

The unattenuated coefficient so obtained measures the correlation that there would be between the two tests if they had been perfectly reliable. It is misleading to refer to this value as the "true correlation" between the tests. For many purposes the attenuated coefficient serves just as well, sometimes the attenuated coefficient gives the information we require while the corrected coefficient would not. If we merely want to discover whether two tests are correlated, a significant attenuated coefficient gives us the required information, and correction for attenuation would add nothing. If we want to know how well a result in one test can be predicted from another, this question is answered by the uncorrected correlation coefficient, the coefficient corrected for attenuation would much overestimate the predictive value of the test. It is only to answer such questions as how far what is measured by one test is identical with what is measured by another that the correction for attenuation is required.²⁸¹

A mental test is of no practical use if its reliability is low. This, however, is not a sufficient criterion of the value of the test, it must also measure what we want it to measure. The property of measuring what it is designed to measure is called its *validity*. When, for example, Binet wished to validate his intelligence tests, he did so by demonstrating that they measured the same thing as teachers meant by "intelligence" and measured it with greater self-consistency than was shown by teachers' estimates. If we wished now to devise a new intelligence test, we could validate it by comparison with an existing test of known validity, if we wish to validate a test of some trait of personality we must do so by comparing its results with assessments of that trait in the same group of people by those who know them well. It is necessary to assume that the criterion against which a test is validated is itself a measure of the quality that the test is designed to measure. It is not necessary that the criterion should itself have high validity so long as it is to some extent valid, but a reasonably high validity in the criterion is necessary if we wish to make a reliable numerical assessment of the validity of our test.

In order to get a numerical estimate of the validity of a test T , it is necessary to have two criteria C_1 and C_2 , which may, for example, be two forms of an existing test of proved validity, or two sets of assessments of the same individuals in respect to the trait tested. This is necessary in order that the estimate of validity

may not be affected by the unreliability of the criterion. The formula for obtaining the validity is then the coefficient of correlation that would exist between the test in question and the criteria if these were perfectly reliable. The quantity required is²⁵

$$\text{Validity} = \sqrt{(r_{TC_1} - r_{TC_2}) / \sqrt{C_1 C_2}}$$

A great deal of work has been done on the validity of various kinds of mental tests. Those that have proved to be of low validity have been discarded, and those in current use have generally proved to be more valid measures than any alternative method of assessing the same characteristics. Certain tests of traits of personality are still of relatively low validity, but the validity of intelligence tests is considerably higher than any other methods of assessing general intellectual capacity. When Binet first introduced his intelligence test it might have proved only a measure of the child's ability to pass such tests. No one, not even Binet himself, could have known that this was not the case prior to investigation. Investigation, however, has proved otherwise. These and other tests of general ability have proved to be measuring the same sort of intellectual ability as is required in intellectual learning, in solving theoretical and practical problems, and in gaining insight into complicated situations. Their results are found to provide the best prediction of success in any activity requiring general intellectual capacity, however remote from the test situation.

3. Individual Intelligence Tests

The word *intelligence* is used in ordinary speech to describe the differences in different individuals' capacity to deal effectively with a novel situation, to learn new subjects, and so on. Every teacher will describe some of his children as more intelligent than others. This does not mean necessarily that they know more than the others, or even that they learn better (for the intelligent child may be idle), but it means that they could learn more quickly than other children and more readily solve new problems. Thus what is meant by "intelligence" is intellectual *capacity* and not intellectual *ability*, i.e. the power of acquiring intellectual skill and not the amount of skill acquired. Also it is not capacity in any particular direction but general capacity of intellect. Thus we may most correctly define intelligence as *general intellectual capacity*. Since, in practice, we must generally measure ability of some kind and infer capacity from it, the term *general ability* is very generally used as synonymous with intelligence.

The conception of intelligence began to be made precise only when Binet brought out his series of tests to be used in measuring

the mental ability of schoolchildren.²⁹ Binet's tests consisted in asking children to answer questions or perform tasks, and judging their intellectual capacity by their success in a number of standardised questions of difficulty graded for different years. Thus a child whose age was 6 years and 3 months might be found able only to perform tasks which are those successfully performed by the average child of 4 years and 2 months. This child, of chronological age (C A) 6 3, would then be said to have a *mental age* (M A) of 4 2. The amount of his retardation as compared with a normal child is expressed by saying that he has an *intelligence quotient* (I Q) of 67. This is the amount obtained by dividing the mental age by the chronological age, multiplying by 100, and expressing the answer by the nearest integer.

The mental age of a particular child is found to increase steadily as he grows older, but more slowly as he approaches maturity. At about 16 the curve of average test performance shows no further rise with age, so that somewhere about then the increase of mental age must be supposed to stop. The individual may afterwards acquire more knowledge, more skill, and more wisdom, but his capacity for acquiring these things has reached its upper limit. Research has also shown that in middle age general intellectual capacity begins to decline, slowly at first, but more rapidly as old age comes on.

Few findings in experimental psychology have been more sharply challenged than this. It seems to the outside critic that the psychologist is making the absurd statement that the intellectual powers of any individual reach their maximum at sixteen years of chronological age. This misunderstanding is avoided if we use the technical term "general intellectual capacity" rather than the popular term "intelligence" in stating what it is that attains its maximum at 16. Few people would deny that the capacity to learn and the capacity to solve new problems decrease with advancing years, and these are the two most important aspects of what the psychologist calls "general intelligence". In many respects the intellectual performance of a man of fifty may be better than that of the same individual at sixteen, because in the intervening years he has learnt a great deal and remembers the solutions of many intellectual problems he has solved in the past. The capacity to learn and to solve new problems becomes progressively less important to the older man since he has already learnt more, and fewer problems are new ones to him. It may be many years later than this before the decline of general intellectual capacity is no longer compensated for by the cumulative effects of what has been already learned.

While the mental age of a child increases during the period of bodily growth, the ratio of his mental age to his chronological age remains approximately constant¹⁰⁵. It is this fact of the *constancy of the I Q* that gives the intelligence test its predictive value, since it is possible to know at a relatively early age whether a child will profit by education at a high level and whether he is likely to succeed in a profession requiring high intellectual ability. It is also possible to detect whether there is so much intellectual defect as to require institutional care or education at a special school.

The constancy of the intelligence quotient is not absolute. An individual child shows fluctuations in the measurement of its intelligence quotient: it may decline as the result of certain cerebro-spinal infections, such as *encephalitis lethargica*,¹¹ and increase in I Q can result from improved environmental circumstances.¹¹ The I Q is, however, constant enough to be a valuable basis of prediction of later intellectual performance; we know that the gifted child of six will remain intellectually gifted, and that the dull child of six is likely to remain dull even though we cannot be certain that the extent to which he is gifted or dull will be exactly the same at sixteen as at six.

The method of representing a child's intellectual brightness by means of an intelligence quotient is unambiguous for the period of bodily growth during which general intellectual capacity increases with increasing age. There are two main sources of difficulty in applying this method of measurement arising from the fact that the increase of general intellectual capacity ceases at an average age of about fifteen or sixteen —

(1) The definition of mental age as the average age at which a given test score is obtained provides no way of defining any mental age greater than sixteen. Yet children of high I Q with a chronological age of thirteen or fourteen may do better at an intelligence test than the average performance at age sixteen (and therefore better than the average performance at any age). If we wish to define a mental age of seventeen or more, we must adopt some other means of defining it than the average age at which that performance is equalled.

(2) Since the intelligence test performance of any individual does not appreciably improve after the age of sixteen, representation of his I Q as $(100 \times MA)/CA$ would show a continuous decline of I Q when the CA was greater than 16, which decline would correspond to no psychological fact.

The first of these difficulties is overcome by adopting a different method of derivation of mental age after 15 or 16. If a child has

an IQ of 150, his mental age at 10 will be 15, *i.e.* his test performance will be equal to that of the average child of 15 years CA. At the age of 14 his test performance will be better than that of the average child at any year. Assuming that his IQ is still 150, his test performance can be regarded as that indicating a mental age of 21. Thus we can define the mental age of 21 as that indicated by the test performance of the average child of 14 with IQ 150, and of the average child of IQ 175 and CA 12, and so on. The actual methods of derivation of mental ages above 16 will be found in books dealing with intelligence tests. They may be regarded as devices by which the principle of constancy of IQ is preserved for all chronological ages up to fifteen or sixteen for children with IQs over 100.

The second difficulty is dealt with very simply by making the denominator of the fraction for calculating IQ that age at which development of general intellectual capacity stops for all individuals whose chronological age is greater than this. Most recent intelligence tests have adopted 16 as the denominator for IQs for all children over 16 and all adults. Thus an adult of MA 24 would be given an IQ of $(100 \times 24)/16 = 150$, whatever might be his chronological age.

This does not quite get over all difficulties since it assumes that the curve of rise of test performance is a straight line inclined to the base up to sixteen, thereafter becoming parallel to the base, whereas there is a gradual decrease of rate of rise beginning a year or two before sixteen. In one of the latest forms of intelligence test, the Terman and Merrill Revised Stanford, this is taken into account, the denominator to the IQ being the chronological age less a small correction which rises from 1 month at a chronological age of 13.2 to 12 months at CA 16.0, for chronological ages of over 16 the denominator remains at 15 (instead of at 16 as in most intelligence tests)²⁶⁶. Thus a child of mental age 13.0 and chronological age 15.6 would be given an IQ of $(100 \times 156)/(186 - 10) = 89$ instead of 84 as it would be by the ordinary method of reckoning. This correction gives a somewhat better estimate of IQs during the period of slowing down of intelligence development which are underestimated by the usual method.

While the IQ is a measure which has the advantage of being very generally understood there is one serious objection to its use as a measure of intellectual advancement or retardation. While an IQ of 100 has the same meaning for any valid intelligence test (provided the norms for that test have been correctly obtained) this is not the case for higher or lower values than 100. For example, a child whose IQ is 140 on the latest Revised Stanford

scale would have had an I Q 132 on the earlier Stanford Revision, while on the Cattell III Group Test he would have an I Q of 157. This difference arises from the fact that I Q s are distributed about their mean with a different standard deviation in different tests, the standard deviations of the above three tests being 15.8, 12.8, and 23.7, respectively.

This source of ambiguity could have been got over if, instead of using I Q s, the intellectual retardation or advancement of children had been indicated by their standard scores with respect to their own age group. The I Q is now, however, too firmly entrenched to be superseded by a method of measurement theoretically sounder. An implication of this fact, however, that must not be forgotten is that, when we want to know I Q s for practical purposes, we must also know by means of what test they have been obtained. The Revised Stanford scale is now so generally used that it is probably better to adopt its I Q as our standard. If an I Q has been measured by means of some other test, we can obtain the corresponding Revised Stanford value by multiplying its deviation from 100 by the fraction σ_{RS}/σ_X , where σ_{RS} is the standard deviation of I Q s on the Revised Stanford test and σ_X is that of the test used. If, for example, we are told that a boy has an I Q of 160 on the Cattell III test, the corresponding Revised Stanford I Q can be calculated as $100 + (60 \times 15.8/23.7) = 142$. The same aim is achieved at Moray House, Edinburgh, by reducing all intelligence test results to an arbitrary I Q scale with a mean of 100 and a standard deviation of 15.⁷⁹ This is another way of achieving the desired result of having an I Q the numerical value of which is not to any degree a function of the test used.

Confusion is sometimes introduced into discussions on education by the use of the word "intelligence" for both mental age and intelligence quotient. Thus one person will say that a child's intelligence increases through its school life while another says that it remains constant. It is clear that they are using the word "intelligence" with different meanings. If the word is used without qualification, it should stand for mental age, so the first speaker's statement is to be preferred. Similarly, in statistical work, if we wish to find out how some function varies with intelligence, we should work out a correlation with mental age, not with intelligence quotient. I prefer to use the term *intelligence level* for what is measured by the intelligence quotient. This term is certainly not free from objection, but there is no generally accepted single term to cover what is meant by both intelligence retardation and intelligence advancement.

Binet's early death in 1911 prevented him from carrying out further improvements in his intelligence scale. The work of increasing the usefulness of Binet's system of tests by revision and extension was carried out by Terman in America who in 1916 published his *Stanford Revision* of the Binet scale, which is described in his book *The Measurement of Intelligence*²³¹. Further revision was carried out after this date, and in 1937 Terman and Merrill brought out a new form of the test which they called the *Revised Stanford* and described in a new book called *Measuring Intelligence*²⁶⁶. This latter form has become the standard individual intelligence test which renders obsolete all earlier forms of the Binet scale. It differs from the original scale in many important respects. It includes tests for young children (down to a mental age of 18 months). It is also much extended at the upper end, including more difficult test items which make possible the assessment of mental ages up to over 22. Two forms of the test, *L* and *M*, were made which are of equivalent difficulty but different material. This is a convenience both in clinical use when a retest is necessary and also for research purposes to provide a means of correcting for attenuation, etc.

There have also been developments in modern intelligence testing which involve a more radical departure from Binet's methods. The most important of these are (1) the use of *pencil and paper* tests or *group* tests of intelligence, (2) the development of *performance* and *perceptual* tests, (3) the devising of intelligence scales for lower age-groups, and (4) the extension of the technique used in intelligence testing to the measurement of school achievement.

4. Group Tests of Intelligence

While individual tests such as the Revised Stanford remain indispensable for clinical use, where the experimenter's observation of the single child during the period of testing can give him much information about the child in addition to the child's mental age, there is a need for intelligence tests which can be administered to large numbers at a time and which can be administered by an untrained operator. These needs are met by the *group tests*. In the testing of the whole American army in the early days of their entry into the 1914 war, it was clearly necessary to have some method by which many persons could be tested in a short time³¹¹. Tests were therefore devised which could be administered to a large number of persons at one time by a single experimenter. Early examples of such group tests were the American Army Tests and the Northumberland Mental Tests⁷¹.

There are now a very large number of such group tests to choose from and for many purposes they are the best to use. For young children, however, less than about seven years of age, the use of an individual test is still recommended.

Most modern group tests demand an elementary form of reasoning. Various types of question are used, as, for example, the analogies test. "KNIFE is to CUT as PEN is to _____". To avoid the necessity for the child writing anything, and also to get rid of the difficulty of assessing the relative merits of different possible answers, alternative answers are printed and the testee is instructed to underline the correct answer. The alternative answers for the above might be WRITE INK PENCIL PAPER. Another form of question is that in which the child is asked to put a circle round the one thing that is different from all the others in such a group as CAT DOG RABBIT LETTUCE MOUSE. Such test items can be made more difficult in tests for higher mental ages by increasing the abstractness of the relation determining the right answer. A more difficult analogies test, for example, would be PETAL is to FLOWER as SLEEVE is to BUTTON POCKET JACKET ARM, while a more difficult item of the other type would be SOLDIER ARMY SAILOR PORTER DRIVER.

A complete group test contains a large number of items of various types. It is usually carried out under a time limit. This has been objected to on the ground that it might be supposed to test quickness of intellect rather than intellectual capacity. It has, however, been shown that quickness and correctness are very highly correlated. A severe time limit is, however, objectionable as introducing an element of stress to which some children respond unfavourably, and in modern tests the usual practice is to have a generous time limit which will allow most children to finish all items completely so that stress is minimised while the practical inconvenience of everyone finishing at different times is avoided.

A group test is generally suitable only for a limited range of mental ages. Choice of a group test for a particular purpose therefore requires knowledge of the range of mental ages for which it is intended. Puzzles of a type similar to those used in the testing of children can be made suitable for measuring higher mental ages by making the relationships determining the right answer more difficult to discover. For example, an item in a group test designed for higher mental ages might be the instruction to put a circle about the one word different from all the others amongst the following: KNOWING DECIDING TASTING WATCHING THINKING SEEING. A group test suitable for older children and adults of superior intelligence is the Cattell III.

5 Performance and Perceptual Tests

Success in the tests modelled on the Binet scale and also in the kind of group tests described above obviously depends on skill in the use of language. It was early obvious that this made them quite unsuitable for use with children or adults who might be unfamiliar with the language of the test or unskilful in its use for other reasons than through defect of general intellectual capacity. The three main classes of people for whom such verbal tests of intelligence were altogether unsuited were aliens, illiterates who owed their illiteracy not to intellectual defect but to insufficient school attendance, and the deaf. For these cases tests were devised in which the use of words was unnecessary and the subject was only required to perform some task which was almost self-explanatory. These are *performance tests*. An example of one such test is the *picture-completion test*, in which the subject is required to fill gaps in a picture by choosing from amongst a number of blocks on which various objects are painted of which only one is correct in any single gap.

A complete scale of performance tests was brought out in America by Pintner and Paterson²²⁰. An improved scale was afterwards constructed in Great Britain by Collins and Drever. Both scales were criticised on the ground that they included too many items (such as the form boards in which wooden insets are fitted into spaces) which show low saturation with general ability. The Collins-Drever scale was an improvement on the Pintner-Paterson in this respect. Alexander later devised a new performance scale including only three items, all showing relatively high correlation with general ability, which was a better performance scale of intelligence tests than either of the earlier ones.⁶

At best, however, the performance scales were an unsatisfactory means of measuring intelligence. They were expensive to make, very much less reliable than a good verbal test, and too much influenced by other factors than intelligence, such as the familiarity of the child with play material similar to that used in the test. They also suffered from the defect that they could not be adapted to group testing and that familiarity with the test material facilitated performance so much that the same scale could not be conveniently used twice for the same individual. They are now of little more than historical interest, since the purpose for which they were devised can be better accomplished by the later perceptual tests.

The necessity for some form of test not dependent on language arose not only from the unsatisfactoriness of verbal tests for those who were considerably deficient in skill in the use of words, but

also from the discovery that even amongst those with normal opportunities of learning the use of language, there were variations in language skill which were independent of general intellectual ability²⁰⁰ This group factor of verbal ability was called *v*. The verbal intelligence test remained a useful measure of general intelligence since the score of a given individual in such a test depended to a far greater extent on his general intelligence than on his special ability in the use of language, but it was clearly an imperfect measure since the individual with high verbal skill would tend to have his intelligence overestimated by a verbal intelligence test whereas the individual with low verbal dexterity would tend to have it underestimated.

In the search for an intelligence test free from this defect, the perceptual test of intelligence was developed. In these tests, problems were given similar to those in a verbal group test but with diagrams, or, for young children, pictures as their elements instead of words. The problem might be, for example, to underline the correct answer in Fig 7*a* or to put a circle round the one different from all the others in Fig 7*b*.

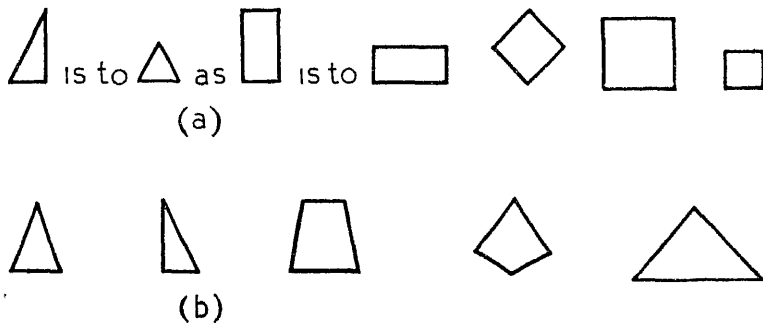


Fig 7 —Perceptual test items *

Perceptual tests proved in all respects a better method of measuring intelligence than performance tests had been. They too had the advantage that their results were independent of the verbal factor while they also had the added advantages of being not

*In tests of the type of 7*b*, it is necessary to take a good deal of trouble to ensure that there is not more than one way in which the figures can be classified as 4 of one kind and 1 of another. The example shown in 7*b* is defective in this respect. It was intended that the second figure should be ringed because it is the only one which has no axis of symmetry. It would, however, also be reasonable to ring the third figure as the only one which has two of its sides parallel.

interior to verbal tests in reliability and validity and in adaptability to the needs of group testing. The hopes that they might prove to be tests of pure general intellectual ability uncontaminated by the influence of any other mental capacity were, however, disappointed when, in 1935, El Koussy showed that they were dependent also on a group factor independent of intelligence which he called *k*.⁷⁷ This may be regarded as the ability to visualise and to perform mental manipulations on visual images.⁷⁸ Since that date psychologists have abandoned the search for a test of pure general intelligence. The best verbal tests and the best perceptual tests are both so largely dependent on the general intellectual factor that they are satisfactory measures of it although neither is wholly free from systematic error by the influence of another factor. A still better measure of general mental ability can be obtained by using a test combining verbal and perceptual items, and many modern intelligence tests are so constructed.

6. Intelligence Testing of Young Children

The lowest age group in the original Binet scale and in the 1916 Stanford Revision was four. Since, however, it is necessary, in order to get a reliable measure of a child's intelligence, that the tests should be used which are intended for a year or two below his mental age, this means that they could not be used satisfactorily for a child of mental age less than six. A Gesell and Charlotte Buhler have now obtained norms of performance for children from six months old.³⁸ Thus when a normally developed child a year old is presented with two sticks he takes both and strikes them against each other, whereas at 6 months he takes one and waves it about. The latter response is therefore evidence of retardation if it appears in a child of twelve months. A quotient corresponding to the intelligence quotient can thus be calculated for children of less than a year old. In the 1937 Revised Stanford scale, material is included for testing intelligence down to a chronological age of two years.

Although such tests at early years may give a true picture of relative intelligence level at those ages, they are of very limited predictive value.³⁷ While the intelligence level of a child of six gives grounds for making some sort of estimate of how intelligent he is likely to prove in later life, this is not at all true of a child of two who may then appear backward although there is no lasting defect of intellectual capacity. It is not until after the age of three that a low level of mental achievement should give rise to the suspicion that there is either an inherited intellectual defect or some sensory incapacity such as deafness.

8. Achievement Tests

These are not intelligence tests but adaptations of the technique of group intelligence testing to the aim of measuring school achievements. While measuring the same thing as the ordinary school examination, the achievement test uses the method of the typical group test of intelligence, a large number of short questions and a rigidly standardised system of administering and marking. These may be questions to test the knowledge of the testee in any of the ordinary school subjects (as history, arithmetic, or a foreign language). Their most obvious field of usefulness is for obtaining a measure of the proficiency of a particular child in a subject as measured against the average proficiency of other children of the same general intellectual capacity. If an achievement test has been standardised on a large unselected sample of the population so that we have norms of performance for different ages, a particular child's score in it may be used to calculate an achievement quotient (A Q) for the subject of the test. This quotient is the average age of the children who have done as well as this particular child, divided by his own mental age, the quotient being expressed as a percentage. That is $AQ = (100 \times AA) / MA$, where AA is the achievement age of the child as measured by the test.

The achievement tests have certain advantages over the ordinary kind of examination. These are speed of administering and marking, objectivity of marking, and their consequent higher reliability (*i.e.* self-correlation). These advantages led at one time to enthusiastic advocacy of the achievement test as a superior method of measuring school proficiency which should replace the older type of examination.¹⁵ There would, however, be grave objections to their adoption for such purposes as for the selection for secondary schools at eleven-plus or to replace the school-leaving examination. Such external examinations fulfil two functions. They are not only required to make as accurate an assessment as possible of each pupil's school achievements but also to determine the substance and methods of the school teaching which leads up to them. Achievement tests would, no doubt, fulfil the first function better than the older type of examination, but their effect in the second direction would probably be educationally disastrous. The form of the achievement test necessarily limits it to asking questions about a large number of facts, and the knowledge that children were to be examined in this way would undoubtedly lead to the schools devoting more time and attention to the educationally unprofitable effort to learn a large number of isolated facts by heart.

CHAPTER XXIII

INTELLIGENCE AND INTELLIGENCE DIFFERENCES

1. What is Intelligence ?

It is easier to show that intelligence tests are measuring something important which corresponds roughly to what we call 'intelligence' in ordinary speech than it is to give a precise account of what this intelligence is. The intelligent person is one who tends to show a good performance in a large number of different intellectual tasks. This may be because there is some general factor underlying his capacity to do them all (as muscular strength is a general factor underlying one's ability to row, wrestle, box, and throw weights) or, on the other hand, the capacities to perform each different mental task might be quite independent of each other so that the fact that a person showed high ability in, let us say, mathematics was no reason at all for expecting him to learn a foreign language easily. The intelligent person would then merely be the one who happened to have a high average capacity for the performance of all intellectual tasks.

Although this view that all abilities are independent of each other is *a priori* possible, and was at one time contradicted by no assured facts of psychology, it need not now be considered since it is ruled out by the observation that all different abilities are positively correlated (even with age held constant). This is true even of abilities as widely different as those required for intellectual tasks and for manual ones.

The discovery that this theory of the complete independence of different abilities is not in accordance with the observed facts does not in itself enable one to say that the theory of a general factor underlying all different abilities is true. There is a third possibility, that different abilities belong together in groups, such as "memory", "imagination", "discrimination", etc., and that the individual whose memory is good will be correspondingly good in all activities depending on remembering, while the goodness of his memory will be no ground for expecting him to be good in tasks depending on imagination. In other words, all abilities belonging to one of these groups might be positively correlated while the groups themselves were uncorrelated. Some such theory as this seems to be implied by the use of such words as "imagination", "memory", etc., in

ordinary speech, but this usage cannot be taken as evidence that these terms stand in any sense for distinguishable groups of abilities. Whether they do so or not is a question to be decided from the evidence derived from mental tests. If this theory were true the intelligent person would be the one who happened to have a high average value of all these ability groups.

The first of these two theories is that known as the *general factor theory* of abilities, the second is called the *group factor theory*. The existence of a general factor of intelligence is however, not incompatible with the presence of correlated groups of abilities. So both theories may be true since groups of highly correlated abilities might exist while the groups themselves might also be correlated to a lesser degree, that is, the intelligent individual might tend to have a good memory and also high powers of imagination, etc. It is now generally agreed amongst psychologists that this is indeed the case (or, more exactly, is one way of representing the actual facts). Certainly there are groups of related abilities, although these are not always the groups distinguished in ordinary speech, and certainly also the groups tend to be correlated with one another so that the individual good in one of them is more likely to be good in any other.

The problem of the nature of intelligence is not merely one of theory. It can also be regarded as the practical problem of how intelligence can best be measured. Binet's method was to take as large a variety of tasks as possible so that an average of the child's abilities in all of these may be obtained. This is the only defensible method on the theory that intelligence is a mere average of a large number of independent abilities, and it undoubtedly will give a measure of intelligence on any theory. But on the other theories it will not be the best method. If there were several group factors, the best test would be that which made the most representative sampling of them, while if there were one general ability, it would be best measured, not by a wide sampling of different abilities, but by the measurement only of abilities in those tasks which are most dependent on general ability.

Most commonly, the early practice of intelligence testing was based on a group factor theory. This was to be expected from the fact that this theory is implicit in our language. The use of such terms as "memory", "imagination", etc., seems to imply that these are names of psychological realities which can exist in varying amounts in different individuals. The psychology based on the acceptance of this implication of ordinary language is generally referred to as *faculty psychology* and is at least as old as Plato. During the last century the idea of faculties became generally

rejected, not because any evidence had been obtained that these words did not state for groups of abilities which were correlated but because it was understood that the fact that they had received names in ordinary speech was no evidence that they had any psychological reality. Under the stress of criticism this way of thinking became untashionable and any psychological theory which made use of related groups of abilities was derided as a revival of the out-of-date faculty theory. For this derision there was no reasonable ground. If the reason for asserting the existence of faculties from the nouns of ordinary speech was inadequate, this merely meant that the question of the existence of faculties remained open, to be proved or disproved by psychological research, not that the faculties were disproved. Still less did it mean that there might not be some mental unities of the nature of group factors which were perhaps other than those indicated by the names of ordinary speech.

Thorndike's method of measuring intelligence is an example of one based on the group factor theory.²⁷² He devised tests to measure four mental capacities which he called *C*, *A*, *V*, and *D*. The resultant measure from the combination of these four sets of tests (intelligence *CAVD*) was regarded as a sampling of these four unitary capacities. *C* (completion) was the capacity to supply words so as to make a statement true and sensible, *A* was the capacity to solve arithmetical problems, *V* (vocabulary) was the capacity to understand single words, and *D* (directions) the capacity to understand connected discourse, as, for example, in carrying out oral directions.

Intelligence tests devised in accordance with this plan undoubtedly do measure what is generally meant by intelligence. It is possible, however, that this is not because intelligence is a resultant of these separate factors but because all four of the capacities depend on the amount of the testee's general intellectual capacity. This was the theory put forward by Spearman and called by him the *Two-Factor Theory*.²⁵⁶ The problem itself and the method of solving it had been formulated at the beginning of the present century by the mathematician Karl Pearson.²¹²

2. The Two-Factor Theory

This is the theory that if a number of abilities are tested (*e.g.* in different school subjects) and no two of these abilities very closely resemble each other, it is then found that each of them is composed of two parts, one a factor common to all the tests (the general factor or *g*) the other a factor different for each test (its

specific factor or *s*)¹ Spearman meant by this that any particular individual's ability in, let us say, arithmetic depended partly on his general intellectual capacity (*g*) and partly on his special gift for arithmetic, and not at all on a group factor of ability for mathematics, which would show itself also in his performance in algebra, geometry, etc

In the form in which Spearman stated this theory it can no longer be defended, since later research has made clear that there are many group factors. The mathematical methods by which he sought to prove it have also been superseded by less clumsy methods. Nevertheless both Spearman's theory and methods retain historical importance since they were stages on the way to more adequate theory and methods.

The proof that Spearman put forward that there was an intellectual capacity which was general (*i.e.* common to all intellectual tasks) was as follows. A number of individuals were tested in different intellectual tasks. The correlation coefficient was calculated for every pair of tests and a table of intercorrelations was constructed as follows —

	A	B	C	D	E
A Mathematical judgment	—	0.485	0.400	0.397	0.295
B Controlled association	0.485	—	0.397	0.397	0.247
C Literary interpretation	0.400	0.397	—	0.335	0.275
D Selective judgment	0.397	0.397	0.335	—	0.195
E Spelling	0.295	0.247	0.275	0.195	—

Table 16 —Bonser's table of intercorrelations between results of five tests given to 757 subjects²⁵⁸

The fact of a positive correlation between any two performances is evidence that there is a common factor in both. The question at issue is whether this common factor is the same for all performances (*i.e.* whether it is a *general factor*) or whether there are group factors common to a few tests but not to all. Spearman pointed out that this difference would result in a difference in the distribution of the correlation coefficients in such a table. If the intercorrelations were mainly due to the dependence of particular abilities on a few group factors, then there would be groups of high intercorrelations between such abilities as depended on the same factor while other intercorrelations would be relatively low. If, on the other hand, all the intercorrelations in the table were due to one general factor common to all the tests, then those abilities

* Note that Spearman did not say, as he is often quoted, that intelligence could be divided into two parts, but that any particular ability could be divided into two parts, of which one was the general factor which is commonly called "intelligence". It was particular abilities and not general intelligence that Spearman considered to be divisible into two factors, and it might have been better to call it a one-factor theory of intelligence.

which depended most on the general factor would tend to correlate most highly with all the other abilities, and would be correlated more or less highly with them according to whether they were much or little themselves dependent on the general factor. Thus the indication of the above table is that, of the five abilities tested, mathematical judgment depends most on the general factor since it has the highest correlation with the remaining tests, while spelling is least dependent on the general factor. In other words, the intelligent individual will be more likely to excel in mathematical judgment than he will in drawing, although in drawing too he is more likely to be good than is the unintelligent individual, since this also is positively correlated with all the other abilities tested. This degree of dependence on the general factor was called by Spearman the *saturation* with g of the ability in question, the term more commonly used at the present time is the *general factor loading*.

It will be noticed that mathematical judgment, which has the highest general factor loading, is most highly correlated (.485) with controlled association, which has the next highest general factor loading, and is progressively less with the next two tests and least of all with drawing, which has the lowest factor loading. In consequence, the table can be arranged as above with all the correlations becoming progressively smaller along each of the rows (and down each of the columns). This arrangement was called by Spearman *hierarchical order*. The possibility of arranging a table in hierarchical order is evidence that all the intercorrelations in it can be explained by means of a single general factor common to all the tests.

Since no empirical table will show perfect hierarchical order, because the correlation coefficients are subject to random errors of sampling, it was necessary to devise a means of testing whether any departure from perfect hierarchical order was evidence for the presence of group factors or could be regarded as due to random errors. The criterion used by Spearman was the calculation of a set of quantities called the *tetrad differences*. If a, b, c, d , are any four tests in the table, then their tetrad difference is the quantity $r_{ab}r_{cd} - r_{ac}r_{bd}$. If the table is a true hierarchy, all tetrad differences will be zero. Since an empirical table can never be expected to be a true hierarchy, the evidence that all its correlations are to be attributed to a single general factor is that the tetrad differences calculated from it, while not exactly zero, do not differ significantly from zero. For example, we may calculate the tetrad difference of the first four tests in Table 16 as $(0.485 \times 0.335) - (0.400 \times 0.397) = 0.1625 - 0.1588 = 0.0037$, which is as near to zero as one would expect.

The calculation of all the tetrad differences from a table of correlation coefficients is, however, extremely laborious if the number of tests is large. Although the test for hierarchical order that is used at the present time is essentially the same in the end as Spearman's method of calculating all the tetrad differences, it reaches that end by a much shorter route. In brief, the method is to determine the exact hierarchy which best fits the observed table of correlations and then to see whether any differences between the observed correlations and those in the best-fitting hierarchy are significant.

The method of doing this is described in Sir Cyril Burt's book *The Factors of the Mind*⁴⁵. It requires the use of matrix algebra. It may seem to the student of factorial methods that the necessity for mastering a new branch of mathematics places on him a great additional burden. This is not really the case. Let us suppose that we have made a table of intercorrelations between fifteen tests. The number of tetrad differences will be 7,560, which will take several months to work out. We can much more easily learn all the matrix algebra we shall need in three or four days from any good textbook.⁴⁶ Then we shall have a method by means of which we can determine the conformity of our table with hierarchical order in the course of an afternoon.

From the point of view of matrix algebra a table of correlation coefficients between tests is a square symmetrical matrix with the principal diagonal missing. The condition under which all intercorrelations can be explained by a general factor is that it shall not be significantly different from a matrix of rank 1. When we say that a matrix is of rank 1 we mean that all the second order minor determinants (*i.e.* all determinants of two rows and two columns that we can make up by taking any four values that lie at the four corners of any rectangle within the matrix) are equal to zero. That is $\begin{vmatrix} r_{ab} & r_{ac} \\ r_{bd} & r_{cd} \end{vmatrix} = 0$, when a, b, c, d , stand for any combination of four tests from the whole group of tests included in the matrix.

Since $\begin{vmatrix} r_{ab} & r_{ac} \\ r_{bd} & r_{cd} \end{vmatrix}$ is simply another way of expressing the quantity $r_{ab}r_{cd} - r_{ac}r_{bd}$, it is clear that this is only another way of expressing the tetrad difference criterion. The economy introduced by the matrix algebra approach lies, however, in the fact that it does not require all these second-order minors to be calculated. Instead, what is calculated is the best-fitting matrix of rank 1, and the differences between it and the observed matrix are examined in order to see whether they differ significantly. For

this purpose the χ^2 test of closeness of fit can be used as described by Burt¹

Both the proof of consistency of the data with a single general factor by Spearman's tetrad difference criterion and the matrix algebra proof depend on one general principle the proof of which can be found in Spearman^{2, 16} This is that if the correlation between two tests a and b depends entirely on the correlation of each with a single factor g common to both, then the correlation between the two tests is the product of the correlation of each with the common factor g , i.e. $r_{ab} = r_{ag} r_{bg}$. It will easily be seen from simple algebra that if this relationship holds for any four tests, the tetrad difference criterion will be exactly satisfied by those four tests.

It is also clear that if this relationship holds through any number of tests, then the matrix of correlation coefficients with appropriate values inserted in the principal diagonals (the *communalities* of the tests) will be of rank 1 since the matrix of inter-test correlations will be of the general form —

$[r_{Ag}^2]$	$r_{Ag} r_{Bg}$	$r_{Ag} r_{Cg}$	$r_{Ag} r_{Dg}$	$r_{Ag} r_{Eg}$
$r_{Bg} r_{Ag}$	$[r_{Bg}^2]$	$r_{Bg} r_{Cg}$	$r_{Bg} r_{Dg}$	$r_{Bg} r_{Eg}$
$r_{Cg} r_{Ag}$	$r_{Cg} r_{Bg}$	$[r_{Cg}^2]$	$r_{Cg} r_{Dg}$	$r_{Cg} r_{Eg}$
$r_{Dg} r_{Ag}$	$r_{Dg} r_{Bg}$	$r_{Dg} r_{Cg}$	$[r_{Dg}^2]$	$r_{Dg} r_{Eg}$
$r_{Eg} r_{Ag}$	$r_{Eg} r_{Bg}$	$r_{Eg} r_{Cg}$	$r_{Eg} r_{Dg}$	$[r_{Eg}^2]$

Table 17 —Matrix of rank one (i.e. hierarchical) resulting from assumption that all intercorrelations between five tests are the results solely of one common factor

It is obvious that in this matrix all columns are exactly proportional to one another which is one way of expressing the condition of a perfect hierarchy. Also it follows that if any four coefficients are taken from the corners of any rectangle within the matrix, then a tetrad difference (or a second-order minor determinant) made up of these four values will be exactly zero. Both of these are ways of expressing the fact that the matrix is of rank 1.

Those familiar with the expressions of matrix algebra will recognise the matrix in Table 17 as the result of the post-multiplication of a column matrix formed of the five quantities $r_{Ag}, r_{Bg},$ etc., by a row matrix composed of the same five quantities. These quantities have been already defined as the factor loadings of the five tests with the common factor g (Spearman's "saturation" with g). The essential process in solving the general factor problem by the matrix algebra method is to discover these common factor loadings of all tests in the battery and from them to construct the best-fitting hierarchy by multiplying them together in the manner shown in Table 17.

The matrix so constructed will of course, have entries in its principal diagonal. These are the *communalities* of the tests. This is the amount of the correlation that the test would have with another application of it to the same group if the correlation between these repetitions were due solely to that factor (g) which the test has in common with all the other tests in the battery. It is not necessarily equal to the self-correlation of the test that would be actually observed if it were repeated with the same group. This would, in fact, normally be larger since any specific factor found in the test itself and not common to any of the others would tend to increase the self-correlation of the test above the amount r_{Ag} .

An example of the results of carrying out this process may be shown by considering the correlations shown in Table 16. I find that the best-fitting hierarchy to this table is got by assuming that $r_{Ag} = 0.707$, $r_{Bg} = 0.674$, $r_{Cg} = 0.603$, $r_{Dg} = 0.556$ and $r_{Eg} = 0.398$. If these are multiplied together in the way shown in Table 17 we get the following hierarchical matrix —

	A	B	C	D	E
A Mathematical judgment	[0.500]	0.477	0.426	0.393	0.282
B Controlled association	0.477	[0.454]	0.406	0.374	0.268
C Literary interpretation	0.426	0.406	[0.364]	0.335	0.240
D Selective judgment	0.393	0.374	0.335	[0.309]	0.221
E Spelling	0.282	0.268	0.240	0.221	[0.158]

Table 18 —Exact hierarchical table showing best fit to Bonser's table of intercorrelations between results of five tests (Table 16)

The entries in this table are obviously not identical with those of Table 16. This might be due either to the presence of factors common to some of the tests which are not common to all the other tests, or merely to the fact that the figures in Table 16 have sampling errors which make them deviate from exact hierarchical order. If the differences between the two tables are examined by the χ^2 method for determining closeness of fit, and are shown not to be larger than is consistent with those differences being due to sampling errors, then the figures in Table 16 are consistent with all the correlations being due to a single factor common to all the tests. In other words, what Spearman would have established by calculating all the tetrad differences is proved by a method which is more economical in time even for a small table, and very much more economical if the table is a large one.

* It is my object in this chapter only to outline the general principles of the method and not to give guidance in details of method. So I have not described either how these factor saturations were arrived at or how the values of the communalities were determined. For details of the processes carried out, students must refer to one of the books on factor analysis^{45, 285}

3 Multiple-Factor Analysis

The first concern of factor analysis was the attempt to prove (or to disprove) the two-factor theory of abilities. More recently, the direction of research has shifted to the problem of identifying group factors which are now recognised to be neither infrequent nor unimportant. Amongst the principal pioneers in this investigation are Burt^{1,2} and Thurstone²⁸⁵

It was not the case that Spearman denied the existence of group factors, his contention was that these were absent from the sets of mental performances commonly employed for testing general intelligence²⁵⁷. He was, however, inclined to attribute the greater part of the difference between the abilities of different individuals to a single general factor of intellectual ability and to consider individual variations affecting groups of abilities as relatively unimportant. More recently, the use of larger numbers of subjects in batteries of tests (with consequent reduction of observational errors) and the use of more accurate tests of significance has led to the opinion that complete conformity to the conditions for a single general factor in test batteries is rare, and interest has shifted from proof of the two-factor theory to investigation of the range and variety of the group factors which may be present in a battery of tests.

The methods of multiple-factor analysis depend on the mathematical proposition that if the correlation between two tests *A* and *B* results from the correlation of each of them with a number of independent factors I, II, III, etc., then the correlation between *A* and *B* is given by the equation —

$$r_{AB} = (r_{AI} \times r_{BI}) + (r_{AII} \times r_{BII}) + (r_{AIII} \times r_{BIII}) +$$

We will here consider only the simple case that we are concerned with two factors, in which the problem is to determine the factor loadings of each test with these two factors so that a matrix in which the entries are of the general form $(r_{AI} \times r_{BI}) + (r_{AII} \times r_{BII})$ will be not significantly different from the original matrix of correlation coefficients between the tests.

As an example of a matrix of correlation coefficients which obviously is not hierarchical, we may take the following inter-correlations selected from those published by Alexander,⁶ in which are shown the intercorrelations of a battery comprising three verbal tests of intelligence and three non-verbal tests. The three verbal tests are V1 (the Otis self-administering), V2 and V3 (two sets of subsections of Terman's Group Test). The non-verbal tests are N1 (the Kohs block design test), N2 (the cube construction test),

and N3 (Spearman's form series test) The table of intercorrelations (to two places of decimals) is as follows —

	V1	V2	V3	N1	N2	N3
V1	—	0.76	0.72	0.36	0.37	0.38
V2	0.76	—	0.83	0.32	0.27	0.30
V3	0.72	0.83	—	0.24	0.16	0.27
N1	0.36	0.32	0.24	—	0.44	0.34
N2	0.37	0.27	0.16	0.44	—	0.30
N3	0.38	0.30	0.27	0.34	0.30	—

Table 19—Intercorrelations between three verbal and three non-verbal tests of intelligence

This table is obviously far from hierarchical, the correlations between any two tests of the same kind (*i.e.* those in the top left and the bottom right quadrants) form two blocks of high correlations, while the remaining quadrants, made up of correlations between tests of different kinds, are relatively too low for a hierarchy. It is true that the correlations between non-verbal tests is lower than that between verbal tests (the former having lower loadings with any common factors in the battery), but their average value (0.36) is considerably higher than that between the verbal and non-verbal tests (0.30), whereas in a hierarchy it would be expected to be a good deal lower.

If we make a tetrad difference equation with two verbal and two non-verbal tests, it has no appearance of being about zero. For example —

$$\begin{aligned} r_{V_1 V_2} \times r_{N_1 N_2} - r_{V_1 N_1} \times r_{V_2 N_2} &= 0.76 \times 0.44 - 0.36 \times 0.27 \\ &= 0.334 - 0.097 = 0.237 \end{aligned}$$

This large value of the tetrad must mean that tests of the same kind have a factor in common which is not also found in tests of the other kind. In other words, the correlations in the table cannot be explained merely by assuming a single general factor common to all the tests, there must also be a second factor which separates the verbal from the non-verbal tests.

To calculate all the tetrad differences in order to find out how this second factor is disturbing the correlations would be a method both clumsy and uninformative. It is better to treat the table as a whole by the method of multiple-factor analysis. The first step is, as before, to find the best-fitting hierarchy. If we assume as values of the communalities to put in the principal diagonal 0.84, 0.86, 0.82, 0.48, 0.40, 0.27, the calculated factor loadings for the best-fitting hierarchy are —

$$\begin{aligned} r_{V_1 g} &= 0.865, r_{V_2 g} = 0.84, r_{V_3 g} = 0.765, \\ r_{N_1 g} &= 0.55, r_{N_2 g} = 0.49, \text{ and } r_{N_3 g} = 0.47 \end{aligned}$$

If these are cross-multiplied in the way already explained, we get as the best-fitting hierarchy —

	V1	V2	V3	N1	N2	N3
V1	[0 75]	0 73	0 66	0 475	0 42	0 40
V2	0 73	[0 705]	0 64	0 46	0 41	0 395
V3	0 66	0 64	[0 585]	0 42	0 375	0 36
N1	0 475	0 46	0 42	[0 30]	0 27	0 26
N2	0 42	0 41	0 375	0 27	[0 24]	0 23
N3	0 40	0 395	0 36	0 26	0 23	[0 22]

Table 20 —Best fitting hierarchy for Table 19

This hierarchical table obviously does not fit the matrix of correlation coefficients actually observed (Table 19) at all well. The set of correlations shown in Table 19 cannot, therefore, be attributed to a single general factor. The discrepancies are of the kind we were led to expect from our first examination of Table 19, the observed correlations between tests of the same kind are all larger than we should expect if a single general factor were present while those between different kinds of tests are all smaller. There is apparently present a second factor which affects differently the verbal and the non-verbal tests, such a factor as, for example, verbal dexterity (or, more precisely, that part of verbal dexterity which is independent of intelligence). The general direction of difference between the observed and the hierarchical matrix can best be shown by subtracting each value in the hierarchical matrix from the corresponding entry in the observed matrix. We get the result shown in Table 21.

	V1	V2	V3	N1	N2	N3
V1	[+ 0 09]	+ 0 03	+ 0 06	- 0 115	- 0 05	- 0 02
V2	+ 0 03	[+ 0 155]	+ 0 19	- 0 14	- 0 14	- 0 095
V3	+ 0 06	+ 0 19	[+ 0 235]	- 0 18	- 0 215	- 0 09
N1	- 0 115	- 0 14	- 0 18	[+ 0 18]	+ 0 17	+ 0 08
N2	- 0 05	- 0 14	- 0 215	+ 0 17	[+ 0 16]	+ 0 07
N3	- 0 02	- 0 095	- 0 09	+ 0 08	+ 0 07	[+ 0 05]

Table 21 —Discrepancies between observed correlation coefficients of two sets of three tests and those expected on the assumption of a single general factor

This situation of all the similar tests being more highly correlated than we should expect on the general factor hypothesis while all dissimilar tests are less highly correlated than we should have expected leads us to the conclusion that there must be a second factor present which affects the two sets of tests differently. If this were the only factor remaining, the matrix shown in Table 21 would be hierarchical, or not significantly different from a hierarchy. As before, we can construct the best-fitting hierarchy to Table 21 by postulating certain factor loadings of each test with the new factor.

The factor loadings which I find for this new factor which we may call X , are —

$$\begin{aligned} r_{V1X} &= +0.18, r_{V2X} = +0.37, r_{V3X} = +0.475, \\ r_{N1X} &= -0.425, r_{N2X} = -0.395, r_{N3X} = -0.20 \end{aligned}$$

If these factor loadings are cross-multiplied in the way shown in Table 17, they will produce a hierarchy which shows that part of the matrix in Table 21 which can be attributed to this second factor. It will be found to be a fairly close, but not a perfect, fit to the figures shown in Table 21. The first line, for example becomes —

$$[+0.03] \quad +0.07 \quad +0.085 \quad -0.08 \quad -0.07 \quad -0.04$$

These discrepancies may be due to the presence of a third factor or to the sampling errors of the original correlation coefficients. Only if the deviations from expectation prove to be significant will it be necessary to extract a third factor.

This second factor which has been extracted (and any subsequent factor) has the property that some of its factor loadings are negative. We may express this fact by calling it a *bipolar factor*. This seems to imply the odd characteristic that it stands for some ability the possession of which makes one do worse in some kinds of test and better in others. While this is not the ordinary way in which we think of an ability, bipolar factors are familiar in other fields of psychology. Extroversion and introversion are, for example, bipolar personality traits. The bipolar factor here revealed may be thought of as the constituent in ability which differentiates between the capacity to carry out a verbal test and the capacity to carry out a non-verbal test. As in the case of extroversion-introversion, it is a matter of free choice on the part of the investigator whether he attaches the positive sign to one end of the bipolar factor or to the other, the second factor loadings of the last three tests might have been represented as positive while those of the first three would then have been negative.

There is, however, no unique solution of the multi-factor problem and, in general, all factor loadings can be made positive if we do not want to have negative loadings on any test. This can be done either by adopting a method of analysis which will give positive values for all the factor loadings or by subsequent mathematical manipulation of the original factor loadings (*i.e.* by rotation of the factor axes). For example, the factor loadings already obtained—

TEST	V1	V2	V3	N1	N2	N3
1st factor	0.865	0.84	0.765	0.55	0.49	0.47
2nd factor	+0.18	+0.37	+0.475	-0.425	-0.395	-0.20

could be replaced by the following set of loadings, all of which are positive —

TEST	V1	V2	V3	N1	N2	N3
1st factor	0.56	0.425	0.3	0.69	0.63	0.49
2nd factor	0.68	0.81	0.85	0.01	0.0	0.14

These are equivalent solutions in the sense that both lead to the same expectations for the correlations between the tests. The predicted correlation between V1 and V2 from the first pair of factors, for example, is $(0.865 \times 0.84) + (0.18 \times 0.37) = 0.79$, while that predicted from the second pair of factors is $(0.56 \times 0.425) + (0.68 \times 0.81)$, which also equals 0.79.

These, moreover, are only two out of an indefinitely large number of sets of factor loadings which would lead to the same result. All sets of factor loadings derived in this way have the property that the factors are uncorrelated with one another. It is also possible to remove this restriction and to use correlated factors (*ie* oblique factor axes) in which case the general factor can be made to disappear by having factors all of which have zero saturation on at least one test. The general factor then appears as a *second order factor* *ie* as the correlation between the primary factors.²⁸⁷

One's first impression from knowing that multiple-factor analysis gives not one but many answers to the question asked is that this fact robs the results of such analysis of all significance, since the investigator is free to rotate his axes to get any solution to the factor problem that he desires. This, however, is based on a misunderstanding of the situation. There are many solutions of the problem of what factor loadings will account for a given set of correlations between tests, but these are all equivalent solutions which have in common the salient features of the matrix of correlations coefficients between tests. All solutions of the case we have worked out, for example, have in common the separation between verbal and non-verbal tests. This separation may be displayed in different ways. Our first analysis, for example, shows a general factor common to all tests and a bipolar factor differentiating between verbal and non-verbal tests, the second shows a factor common to all the tests but principally found in the non-verbal tests and another factor (which we shall be inclined to call the *verbal factor*) which is found in all the verbal tests but not to an appreciable extent in the non-verbal ones. An alternative analysis could be made which would show a general factor common to all the tests and a factor found only in the verbal tests, and a third factor found principally in the non-verbal ones.

All these are, however, ways of expressing the one fact that all the tests have something in common while there is also something in common between tests of the same kind which is not also common to tests of different kinds. They are not really different solutions but different ways of saying the same thing.

The appearance of inconclusiveness in multiple-factor analysis arises from supposing that there are unitary powers of the mind the nature of which is to be discovered by factor analysis. Alternatively we may regard human ability as varying in different directions and factor analysis as means of finding out in what directions it is convenient to make measurements in order to get the maximum information about the abilities of particular individuals with the minimum number of tests. Its aim is primarily practical to discover what tests to use to get the most information about the ability of a particular individual. If Spearman's "two-factor" theory were true, then only one set of tests would be necessary to get full information about an individual's intellectual abilities: a battery of tests heavily loaded with g , each part of which was so weighted as to make the loading of g on the whole battery a maximum. If there are also other directions of variation of ability, then other tests must also be used to give full information. It may still be true that the greatest part of the information about an individual's intellectual ability will be given by a test measuring his general intelligence, but fuller information will be given by other test batteries aimed at making measurements in other directions.

We have already mentioned some of these other directions of variation of intellectual ability which factor analysis has revealed. We can measure the verbal factor (v), el Koussy's k factor of ability to deal with spatial relations, the arithmetical factor (a) common to all numerical relationships, and probably a factor of mechanical ability (m) distinct from k and also entering into mechanical and manual operations. Along which of these lines it is important to measure in a particular case depends on the purpose for which the measurement is carried out. For the boy intending to be a barrister, v is more important than k , if he were intending to be a draughtsman the relative importance of these two factors would be reversed. The general intellectual factor g would be important for both, although perhaps a high g is more essential for the intending barrister.

The method of factor analysis can be used for other purposes than the study of abilities. It can also be used for determining the convenient directions of measurement in personality assessments^{45, 50}. For this purpose it would seem to be a better means than the commonly accepted alternative of choosing amongst the

traits distinguished in popular speech as directions of measurement. Its use has been objected to on the ground that it is stated that factors are static and isolated whereas the real variables of personality are changing and interrelated.¹⁰ There seems no reason for this objection. Factor analysis is a technique for distinguishing possible directions of measurement: it is not a theory about the nature of the things measured.

4. The Inheritability of Intelligence

It was at one time a matter of controversy whether the intelligence quotient of an individual was determined at birth as an inherited character or whether it was the result of the intellectual training and other environmental influences by which he was affected during his life. This is a matter on which we now have sufficient information to feel reasonably confident of the answer. Both factors are partially responsible for the individual's intelligence quotient, but inheritance plays a much larger part than does environment.

It is necessary to be clear as to what the problem is. It is sometimes stated as if the question at issue were whether an intelligence quotient would develop if the individual had no inheritance or no environment, and the conclusion is drawn that inheritance and environment are complementary and that the intelligence quotient must be regarded as a product of both. This is a meaningless answer to a meaningless question.

The problem may be clarified by considering it in this way. In any given population there are individual differences in intelligence. These individuals differ also in inheritance and environment. Their observed differences in intelligence (if they are not uncaused and random) must be due either to their differences in inheritance or to their differences in environment or to both together. If both together contribute to intelligence differences, then it is meaningful to ask what proportion of the observed differences in intelligence are due to differences in inheritance and what proportion to differences in environment.

It is obvious that the answer to the last question must depend on the properties of the particular population of which it is asked. If one can imagine a population in which there were no differences in inheritance (*e.g.* a population entirely composed of multiple-birth identical twins), then all differences in intelligence in the population must be due to differences in environment. Conversely, in a population of completely uniform environment, all intelligence differences must be due altogether to differences in inheritance. In a population in which both inheritance and environment differ from

individual to individual, the percentage contributed by each set of causes will vary with the heterogeneity of the population with respect to that set of causes. For example, if environmental differences are extreme, ranging from great poverty and lack of educational opportunity to their opposites, then if environmental circumstances affect intelligence at all, the percentage contribution of environmental differences to intelligence differences will be relatively great for such a population.

Studies of this question have followed two main lines: those directed towards the effects of similarity of inheritance on similarity of intelligence quotients and those based on study of the effect of environmental changes on intelligence quotients. The essential lines for the first direction of investigation were perceived first by Galton, whose data, however, were insufficient for a full solution of the problem although they led him correctly to conclude the paramount importance of inheritance in determining intelligence differences.^{10,2} He pointed out that the one case we know of two individuals having identical inheritance is that of identical twins. Twins are of two kinds: *fraternal twins*, resulting from the simultaneous fertilisation of two ova, who may be of the same or of different sexes and who resemble each other in inheritable characters as much as and no more than two ordinary siblings (*i.e.* brothers or sisters), and *identical twins*, resulting from the splitting and development into different individuals of a single ovum, who have identical inheritable characters.

It was early found that the intelligence quotients of pairs of identical twins were more closely correlated than those of ordinary siblings. Wingfield found a correlation of 0.90 between the intelligence quotients of identical twins,³⁰⁶ a value which has been confirmed by other investigations. The correlation between the intelligence quotients of non-identical siblings is about 0.50. Thus it is clear that increase of closeness in inherited characters increases resemblance of intelligence quotients.

From this and similar studies many psychologists rashly drew the conclusion that intelligence was entirely determined by inheritance. This, however, is obviously not proved, since both siblings and identical twins are likely also to have closely similar environments. That environmental factors also played a part in determining intelligence differences was indicated by researches carried out in America on the effect on children's IQs of adoption into a foster home.⁴¹ It appears that an average improvement of about 5 points in IQ may result from adoption of children from an orphanage into a foster home providing a good environment. Influence of environment on intelligence is also indicated by a

correlation of +0.34 between the intelligence quotient of the adopted child with that of children of the family into which they have been adopted, after about four years of residence there. If there were no effect of environment on intelligence, this correlation would be expected to be zero unless there were some tendency to send children to families of a level of intelligence comparable with that of the child himself.

The conclusion of the investigator Dr Barbara Burks from this enquiry was that, in the population studied, the contribution of environmental circumstances to intelligence differences was about twenty to twenty-five per cent, while that from heredity was about seventy-five to eighty per cent.

Both methods of study were combined in an investigation by Newman, Freeman, and Holzinger, in which a comparison was made between nineteen pairs of identical twins, who had been separated soon after their birth and lived apart all their lives, with a larger number of identical-twin pairs who had suffered no such separation.²⁰¹ It was found that the separated twins differed in I.Q. considerably more than the unseparated twins. This indicates a considerable contribution of environmental factors to the determination of intelligence differences. The conclusion of the authors is that the contribution of heredity to I.Q. is somewhat less than fifty per cent.

This conclusion does not seem to be borne out by the correlations between I.Q.s of the two sets of twin pairs which were obtained by the authors from two intelligence tests. These are shown in Table 22.

	UNSEPARATED	SEPARATED
Binet I.Q.	$r = 0.91$	$r = 0.67$
Otis I.Q.	$r = 0.92$	$r = 0.73$
Mean correlations	0.915	0.70

Table 22—Correlations between I.Q.s of twin pairs, unseparated and separated

The correlation coefficient may be regarded as the ratio between that part of the variance which is due to causes acting alike on the two members of any pair, and the total variance due to all causes (including errors of measurement). The separated twins have heredity in common, but different environments, while the unseparated twins have heredity and environment in common. Thus for the separated twins $r = V_H / (V_E + V_H + e)$, if V_H stands for that part of I.Q. difference that is due to differences in heredity, V_E stands for that part due to environment, and e to the element of error in the intelligence test measurements. It is easily seen that even if the test errors were zero, a correlation coefficient of +0.70 between the separated twins would indicate a contribution

of heredity to I Q of about 70 per cent. If, moreover, one considered that the failure of the correlation coefficient to be unity between unseparated twins were entirely due to such errors of measurement (and not, as it may be, partly to such differences in environmental conditions as may occur between children living together) and assumed that the errors of measurement in the tests applied to the separated twins were of the same size, then the estimate of the contribution of heredity to the I Q differences of the separated group would rise to 76 per cent.

Since the separated group is small, there must be an element of uncertainty in the absolute values of these estimates but it is clear that these results do not contradict Burks's estimate of 75 to 80 per cent for the influence of heredity on I Q in the United States. It must be borne in mind that this figure would not necessarily also hold for a population differing from that of the United States either in genetic homogeneity or in uniformity of environmental conditions.

5. Practical Implications of the Results of Intelligence Testing

The essential discoveries from research on intelligence testing may be summed up as follows —

(1) *By the use of various forms of test it is possible to obtain a reliable indication of the general intellectual capacity of an individual child*

(2) *If the mental age so obtained is divided by the child's actual age we obtain a ratio (the I Q) which remains approximately constant throughout the child's development, and which is the best single indication of his educability and of his probable later success*

(3) *The individual's general intellectual capacity (i.e. mental age) increases through the period of bodily growth and becomes constant at some time about the age of sixteen, declining later in life with advancing old age*

(4) *The differences between intelligence levels (I Q's) of different individuals is mainly determined by their heredity, but it is also affected to a measurable extent by environmental factors*

These facts have important bearings on the problems of education and of the efficient fitting of individuals into the economic structure of society. That there is wide inequality in intellectual capacity is not a very surprising finding. Few men have the capacity for muscular development necessary for a first-rate navy or prize fighter, and similarly few only have the amount of intelligence necessary to make a first-rate business man or lawyer.

In an ideal organisation of society, every man would be in an employment suited to his intelligence. The person with an intelligence quotient of 80 or 90 is neither happy nor efficient if he holds an administrative or organising post which requires an intelligence quotient of about 120. Similarly a man with an intelligence quotient of 120 is neither happily nor efficiently employed in manual labour. Indeed investigations of monotonous work have indicated that this may be carried out better by persons of low intelligence than by those of higher intelligence.

It is interesting to enquire how far men's occupations are at present related to their intelligence quotients. The difficulties which arise from the uncertainties in the testing of the intelligence quotients of adults may be avoided by attacking the problem indirectly and inferring the distribution of intelligence amongst men in different occupations by measuring the intelligence quotients of their children.⁴ This was done in Northumberland.⁷¹

The cases examined were not numerous enough for any certain conclusions, but the figures showed a distribution of intelligence which was roughly what would have been anticipated. Men holding professional and administrative posts were found, on an average, to have children of highest intelligence level, while the average I Q's of the children grew progressively lower through the less responsible occupations down to the lowest grades of manual labour.

A result obtained by the method of averages cannot, of course, show that the position is altogether satisfactory from the point of view of social efficiency. Even if, on the average, persons holding professional and administrative posts have the highest intelligence, it remains possible that there are a considerable number of individual misfits (*i.e.* persons of low intelligence in administrative posts, and persons of high intelligence doing manual labour). These misfits would represent a serious loss of efficiency in the social organism. An attempt to estimate the extent of this loss was made in 1935 by two sociologists.¹⁰¹ They found that although in Great Britain at that time the proportion of children with very high I Q (the highest one per thousand) was greater amongst the social group in which the parents had sufficient means to give them satisfactory educational opportunities, the absolute number was just as great amongst the more numerous wage-earning members of the community. Some of the latter were no doubt given grammar-school

* The intelligence level of the mother is, of course, of equal importance with that of the father in its influence on that of the children. Since, however, the average of a large number of families is taken in the above investigation, the neglect of the intelligence of the mother will have no serious effect on the reliability of the result.

and university education by means of scholarships, but a great many must have been lost to those occupations in which they would have been socially most useful through lack of educational opportunity

Since that date it has been made easier for the intelligent children of poor parents to go through grammar schools and universities, through the selection of children for grammar-school education by the use of intelligence tests as well as tests of scholastic attainments and the abolition of fees for municipal grammar schools. There has also been a much more generous provision for financial aid by State scholarships for university courses. The number of children of high intelligence level in this country not receiving the education suitable for their I Q s has probably now become very small.

Another educational problem arising from intelligence differences is that of providing a suitable education for those children whose intelligence level is too low for them to profit by the teaching given to ordinary children. Special schools are provided for the *mentally deficient* group of children (of I Q from 50 to 70) in which they are given an education more suited to their needs than that of the ordinary schools, and are saved from the discouragement which would result from being backward in ordinary classes, and perhaps being punished as idlers by ignorant teachers. These schools are excellent and suffer only from the disadvantages of being expensive to run, of having a social stigma attached to attendance at them, and of segregating the children so educated from social intercourse with other children. In the provision for the education of the mentally defective in the Education Act of 1944, it is intended that as large a proportion of these children as possible shall be educated in special classes in ordinary schools instead of in special schools.

Even with the provision of special schools for children of I Q less than 70, and the separating of the remainder by intelligence differences into those who attend grammar schools after the age of eleven and those who continue their education at modern or technical schools there remains a wide difference in intelligence level amongst the children of any one type of school. The educational disadvantages of this diversity in rate of learning is being increasingly met by the provision of triple classes for those of average ability for their type of school and those of less than average ability and those of more than average ability.

Realisation of the nature of intelligence differences makes it possible for the educational process to achieve the purpose of giving every child the equipment of knowledge and skill for which

his innate capacities fit him, without pressure to make him acquire more than is possible for him. Education can thus be humanised and made more efficient. The principal obstacle to this advance is the widespread popular ignorance of the reality of innate differences in intellectual capacity and the attribution of educational success to hard work and of failure to idleness. It must be understood that capacity for educational success is an inborn character like hair colour, and is deserving neither of praise nor of reward, and that lack of intellectual capacity is also undeserving of blame. Industriousness is a character trait of great value, but it is not best developed by an educational system which demands equal performance from all children irrespective of their capacities.

6. Transfer of Training

This is a practical educational problem arising from consideration of the question of the analysis of abilities into general intelligence and group factors. When it was taken for granted that memory was a unitary mental capacity, it was natural to suppose that if children were exercised in one kind of remembering, they would show an all-round improvement in all kinds of remembering. This hope led to the widespread use of learning by heart as a means of general intellectual improvement. Similarly, if one general intellectual ability underlies all abilities, one may hope to train this general ability in one subject and find an all-round improvement of intellectual capacity. Of course, it might be the case that neither memory nor intelligence were improvable by training, the hope would not then be fulfilled. If, on the other hand, there were no unitary capacity of memory or of general intelligence, there would be no reason whatever for the hope.

The problem of general improvement of memory was the first question of this kind to be attacked by the experimental method. W. James had doubted whether the word "memory" stood for any unitary mental capacity, and did a preliminary experiment with himself as subject which seemed to show no improvement of memory with practice¹³¹. The first experiment with a sufficient number of subjects to enable any conclusion to be drawn was one done by Ebert and Meumann⁷³. In this experiment a group of children tested for their remembering ability in a variety of tasks (letters, vocabularies, prose, poetry, etc.), both at the beginning and at the end of a period of practice in learning nonsense syllables, seemed to show an improvement on the retest of an amount proportional to the degree of relationship between the practice and the test material. Unfortunately these experiments were defectively designed since there was no control group tested

and retested after the same interval but without the intervening period of practice. The improvements observed may therefore have been due either to the practice given in the test material itself or to the fact that on the retest the children were older by the period of the interval than they were on the first test. Later experiments have indeed proved that these factors do produce an improvement on the retest when there has been no intervening period of practice.

A more elaborately designed experiment by Sleight with adequate controls did not indicate any transfer of training from one kind of remembering to another.²¹¹ Subjects, for example who had received practice in learning poetry, showed improvement in their learning of poetry, but, in their power of learning prose they showed no more improvement than those who had no practice at all. His conclusion was that when allowance is made for the effect of training on the test material itself, and the probable error of the final results has been calculated, there remain no significant figures in the final test results showing improvement in the power of remembering other kinds of material than those on which the subjects had been trained.

This negative conclusion as to the possibility of transfer of training from one remembering operation to another is considerably modified by Woodrow's more recent experiments in which a distinction is made between *practice* and *training*.³⁰⁷ He used three groups: (1) a "practice" group who merely practised learning by heart during the period between the initial and final test, (2) a "training" group who both practised learning by heart and also received instruction in economical methods of learning, and (3) a control group who took the initial and final tests without any practice or instruction during the intervening period. While the practice group showed no significantly greater improvement in a memory operation different from that practised than did the control group, the group who underwent training which combined practice with the inculcation of principles by which the benefits of the practice could be generalised, did show a marked superiority in the final test as compared with both of the other groups. It appears, therefore, that practice in one kind of memory operation may lead to improvement in another kind of remembering if instructions are given in the general principles of more efficient remembering.

The finding that training in this sense can be transferred from the particular operation in which the subject has been trained to other operations involving the same general principles has been confirmed for other learning operations as well as that of learning by heart. Cox, for example, tried the effect of practice and of

training in one kind of mechanical assembling and stripping operation, with a beginning and end test in another type of manual operation.⁷ He confirmed Woodrow's finding that whereas the practised group showed no more improvement than the control group the trained group who had also had instruction on the principles of manual skill, did show superiority to the other two groups in the different type of manual skill which was tested at the beginning and the end. The conclusion appears to be justified that if we want practice in one kind of learning task to be carried over to other kinds of learning task, we must consciously aim at this result in our teaching, accompanying the practice with specific instructions as to how it illustrates general principles of learning.

An earlier investigation by Thorndike²⁷³ was directed towards the testing of the commonly made claim that certain school subjects have value as a general training of the mind. His method was to find out how far changes in intelligence quotients during the school life of children were related to the particular combinations of subjects they were studying. Very little difference was found between the general effects of different subjects, and no confirmation was found of the general opinion that the study of Latin was of special value as providing a general intellectual training. It seems likely that the belief in this general value of the study of Latin is based on two facts—that (in the past, at any rate) it has been the boys of superior intelligence who have studied the classical languages and also that the difficulty of these has made them an effective intelligence test (although, of course, one that is very extravagant in its demands on school time, effecting in several years a sifting of bright from dull pupils which a modern intelligence test could do in an hour).

Re-examining these conclusions in the light of Woodrow's distinction between practice and training, we may say that it is reasonable to expect that any general effects on the mind will depend less on what is taught than on how it is taught. There seems no reason for expecting that, for example, the capacity to think clearly will result as a mere by-product from the study of Latin. On the other hand, this study may be made the basis of general instructions on the principles of clear thinking which it illustrates. It is by no means certain that, even so, it will have any more value for general training than, let us say, the study of a modern language or the exercise of paraphrase in the pupil's own language. The same considerations apply to the study of mathematics.

No subject can justify its place in the curriculum by its alleged value as a method of general training. The only valid justification for teaching Latin or mathematics to children is that we want them

to know these subjects. This may well be sufficient justification. If we want to be able to read Latin writers or to know the etymological origins of much of our own language, knowledge of Latin is necessary. Knowledge of mathematics is equally necessary if we are to perform calculations. At the same time, the value of learning both subjects may be much enhanced if they are taught in such a way as to illustrate general principles of thinking which can be transferred to other fields.

7. Is the Level of Intelligence Declining?

From time to time alarming suggestions are made in the popular press and elsewhere that the general level of intelligence is lower than it should be and is rapidly declining. An American writer has said, for example, "The civilised races of the World are biologically plunging downward", and quotes as evidence of this fact that "The army mental tests have shown that there are, roughly, forty-five million people in this country who have no sense. Their mental powers will never be greater than those of twelve year old children"³⁰⁵. This sounds serious until one realises that the average mental age of the adult population is fifteen, and in a normally distributed population a considerable proportion will be of mental age of twelve or less. Sometimes the suggestion is made in the form that nearly half of the population is of sub-normal intelligence, as if this were an empirical fact justifying alarm and not (as it is) a mere necessity of mathematics. Of the same order is the statement of a Scottish publicist that a quarter of the population of Scotland was mentally defective, a conclusion which can only be justified by defining mental defect as the first quartile of the intelligence range. In this form the statement must obviously be true of any population which shows individual differences of intelligence, however high the average intelligence of that population may be.

Obviously any study of the intelligence level of one generation can tell us anything about whether intelligence is declining or not, and it is meaningless to assert that the general level of intelligence is lower than it ought to be, since we have no standard on which to base such a valuation. On the other hand, it is reasonable to enquire whether study of existing intelligence levels gives grounds for supposing that there are causes at work which may be expected to cause intelligence decline.

A number of investigations have been made which seem to reveal such causes of decline. It has been found that there is a negative correlation between I.Q. and size of family^{46, 63, 270}. This does not mean, as is sometimes supposed, that the fact of coming

from a large family makes it likely that a child will have low intelligence but that parents of low intelligence tend to have larger families than those of high intelligence. A large family from highly intelligent parents consists of children no less intelligent than those belonging to small families with parents of the same level of intelligence. This general tendency for large families to belong to relatively unintelligent parents is found in spite of the fact that people of the lowest intelligence levels (idiots and low-grade imbeciles) have no families at all.

If intelligence is to a large extent inherited, this differential birth-rate is a cause which may be expected to produce a progressive decline in the average level of intelligence, which has been roughly estimated as about five points of IQ per century. That a noticeable decline of IQ has not already occurred may be explained by the fact that this cause has only been operating for a short time. A century ago large families were general and the probability of survival of the children born to intelligent parents was probably somewhat better than for those born to unintelligent parents, so any change in the average level of intelligence may then be supposed to have been in the direction of a tendency for an increase of intelligence.

While this must be considered a serious possibility, there is no evidence whatever that such a decline of intelligence is taking place. Intelligence tests have now been used long enough for it to be possible to make a first somewhat uncertain estimate of change of intelligence level with time. In Scotland the test scores of all children of ages between eleven and twelve were obtained in 1932 and a repeat test was given at the same age in 1947.²⁷⁰ A slight increase in average test score was found. It is unfortunate that the tests used on the two occasions were not exactly the same, it is also possible that the increase was due to the greater "test sophistication" of the children, *i.e.* their greater familiarity with mental-test procedure on the second occasion. It remains true that there was no evidence of decline of intelligence level over this period of fifteen years. A similar enquiry in England with an interval of ten years and 31,708 children on the first testing and 28,500 on the second revealed no significant difference between their mean intelligence quotients.⁷⁹

A longer period of research is necessary before we can know certainly about this matter. At present it appears that there are causes at work which we should expect to produce a decline in average intelligence level, but there is as yet no evidence that such a decline is taking place. It has been suggested that the expectation

of a decline may be based on a too-simple view of the genetics of the inheritance of intelligence

8. Intelligence and Race

There is some uncertainty about the results of investigations as to whether there are racial differences of intelligence. Sometimes, as in studies of the intelligence of immigrants of different nationalities, it is doubtful whether the samples can be regarded as truly representative of the populations from which they are drawn. Sometimes it has not been found possible to eliminate the effects of differences in social status (as, for example, between white Americans and American negroes). Also it is unlikely that tests devised and standardised in one cultural setting give a valid estimate of the intelligence of an individual living in a very different cultural environment.

Nevertheless, certain conclusions may be drawn with a considerable degree of probability. Differences of average intelligence between the members of different European races and of the stocks derived from them seem to be non-existent or too small to be detected by present methods. Also, there seems to be no measurable difference between the intelligence of Europeans and the Chinese and Japanese. Although all investigations of the intelligence of Africans and of American negroes suffer from the defects above mentioned, it seems reasonably certain that the average intelligence level of negroes is lower than that of the white races, although it is likely that the difference is less than is indicated by a simple comparison of intelligence-test results²²⁴. It is likely that the negro races, such as the aborigines of Australia, are of still lower innate intellectual capacity²²⁵.

If it is true that the average intelligence quotient of negroes is lower than that of the white races, this fact lends no support to the popular view of the racial superiority of the whites. This view could be expressed in the meaningless proposition that "the negro is intellectually inferior to the white man". In truth, there is a wide range of I.Q. found amongst white men as well as amongst negroes, and an intelligent negro is more intelligent than an unintelligent white man. He is also as capable of profiting from a superior education as an equally intelligent white man.

CHAPTER XXIV

THE PSYCHOLOGY OF AESTHETICS

1. Natural Objects of Beauty

The pleasurable reaction which we call the experience of beauty is obtained both from works of art and from natural objects. In the pleasure which we get from natural objects many different factors seem to enter and our total reaction when we describe a scene as a beautiful one is the resultant of all these factors. The free exercise of any of our behaviour tendencies is pleasurable and any object which demands such activity tends to give pleasure when we look at it. The pleasure we derive from the appearance of a mountain is not unconnected with the joy of climbing it. Any scene which has associations with pleasant incidents in our lives attains this same simple pleasure-giving quality. Apart from these, however, there is a pleasure in green foliage, running brooks, and sunshine, which is probably the primitive response of the organism to beneficial environmental conditions.

One of the most important objects of natural beauty is the human form. It cannot be doubted that the pleasure taken in the appearance of the human form is the result of the appeal it makes to the tendency with a more powerful content of pleasure than any other—the sex instinct. The form most strongly appreciated as beautiful is almost invariably that of the opposite sex, and the form most highly esteemed, at least by the early painters, was that most suited to be the sex-object. Indeed, Schopenhauer maintained that, apart from sensual feeling, there was nothing to admire in the outline of a woman's body, which appeared to him from the purely aesthetic point of view to be ugly.

In view of the widespread effect of sexual impulses in determining emotion, it is reasonable to suppose that some part of our complex emotional reaction to a work of art may also be determined by its arousal of emotions belonging to the sex system. The assertion, however, that the full explanation of aesthetic experience is to be found in its arousal of emotions connected with repressed sexual impulses is obviously contradicted by elementary facts of experience. The sexual content of a poem or painting generally recognised as of high aesthetic merit may be identical with that of one which is equally generally recognised as having no aesthetic value whatever. The essential criterion of art value must therefore be something other than sexual content.

2. Works of Art

We do not know how early in history men first began to impress upon objects made for their use those qualities of form which made them also beautiful. Pictures of reindeer and bison found in caves of palaeolithic age may have been originally intended for magical control of success in hunting, but some of them have also a beauty of form which awakens an aesthetic response in the beholder of the present day.

The artistic impulse may find its expression by the giving of beauty of form to an object designed for use. Knives, jars, and vases of early civilisations, like the best in our own time, often show the mark of having been made by men not satisfied only with making serviceable implements but desirous also of giving them pleasing qualities of form.

Although in theoretical discussion it is not unusual for attention to be focused on the psychologically simpler expression of the artistic impulse in works of fine art such as paintings, music, etc., which serve no other purpose than the aesthetic one, it must not be forgotten that the imposing of artistic form on objects of use is as characteristic and important an expression of the aesthetic energy of a society as is the creation of works of fine art.

The creation of a work of art is a social activity, the creator intends to awaken some response in persons seeing or hearing his work. We may call this response the *aesthetic reaction*. It is sometimes maintained that having an aesthetic reaction to a work of art is the same thing as experiencing pleasure from it. Indeed, the instructions in a psychological experiment on aesthetic appreciation may take the form "Report which of these pictures you find most pleasing". Since pleasure is a common accompaniment of aesthetic experience, it may conveniently be used as an indirect measure of it, but there is insufficient ground for suggesting that they are the same. We also obtain pleasure from hearing a story that makes us laugh, but the quality of humour is plainly not that of giving pleasure but of causing amusement, which happens generally to be pleasurable. That they are not the same is clear from the fact that we may derive much pleasure from hearing a story which is not at all funny, and (less commonly) we may laugh at a story which seems to us to be unpleasant. Plainly we do not mean the same thing when we say that a story gives us pleasure and that we find a story funny.

Closely parallel considerations lead us to the conclusion that when we say that we find a work of art beautiful, we mean something different from the statement that it gives us pleasure. A picture by Vermeer of high artistic merit may give us pleasure

and this pleasure may come from various sources from the pleasurable associations of its subject matter as well as from our pleasurable appreciation of its artistic merits. But a picture of no artistic merits at all, a Christmas card with, let us say, a picture of a robin perched on a sprig of holly may also give us pleasure entirely derived from its subject matter. It may indeed at some times give us more pleasure than the Vermeer. On the other hand, a picture dealing with a highly unpleasurable subject matter but of high artistic merit, such as Picasso's *Guernica*, may arouse aesthetic appreciation although the total resultant emotional state is an acutely unpleasurable one, since the pleasure which would result from aesthetic appreciation is outweighed by the unpleasure which is our reaction to its painful subject matter.

It remains true, of course, that we can use degree of pleasure as a criterion of the aesthetic reaction when the subject matter is affectively indifferent, for example in such an experiment as that of Fechner's in which subjects were asked as to their preferences for various proportions of the two sides in a rectangle.⁸³ It becomes of more doubtful value when we are asking them to express preferences for such material as pictures. The question "Which of these two pictures gives you the greater pleasure?" may produce an answer to the question as to which calls out the stronger aesthetic reaction, but it may be an answer determined by preference for the content or by the greater familiarity of the one picture. It may indeed be answered without difficulty by someone who has no aesthetic reactions whatever to pictures.

The reaction to works of art differs from the reaction to humour in the fact that it lacks an easily recognisable characteristic behaviour reaction like laughter. The aesthetic reaction is on its behaviour side most easily identified as a tendency to react by some interjection expressing admiration. Certainly it also has an affective accompaniment which can be detected (but not identified) by its physiological concomitants. Thus A. E. Housman reported that experience had taught him when shaving to keep a watch over his thoughts, because, if a line of poetry strayed into his memory, his skin bristled so that the razor ceased to act.¹²⁴ The rising of the hairs on the skin is one of the physiological concomitants of an emotional state. The psychologist finds it more convenient to use others for experimental purposes, e.g. changes of skin resistance or alterations of breathing rate. It is true that no externally observable character of the emotional response guarantees that it is an aesthetic response and not a response to some associative quality of the art material used to call it out, that can only be known by the introspective report of the subject experimented upon.

From the fact that a work of art has for oneself the character of provoking the aesthetic response, it does not follow that the response comes always when we experience this work of art. One may read a familiar poem, such as Keats's *Ode to a Nightingale*, twenty times without once experiencing the emotional shock of wonder and admiration which is the aesthetic response. Each time one may have the non-aesthetic intellectual experience of noticing its mastery of poetic diction, but without any accompanying aesthetic feeling. Then on the twenty-first reading, after perhaps an unusually long interval or because the reader is in a more receptive frame of mind, the shock of the original aesthetic response may occur again. One is not inclined to say that it is a good work of art only when one has the appropriate emotional response, any more than we say that a joke is not funny because familiarity has made us no longer laugh at it. Our judgment about it remains the same. The fact that we regard it as a successful work of art is the judgment that we have experienced the aesthetic experience from it and that we may do so again. It may even be the judgment that we may some time obtain the aesthetic experience from it although we have not done so yet. A work of art unfamiliar in form may seem displeasing on first acquaintance, but we may continue to read it or look at it because others judge it as of high aesthetic quality and this judgment seems to us to be reasonable ground for hoping that when we understand it better we may do so too.

It is clear that we must distinguish between the aesthetic reaction itself and an *aesthetic judgment* which is not an emotional experience but an assent to a proposition about a work of art which may or may not be based on an aesthetic experience. In experimental work on aesthetics, we are necessarily generally compelled to ask our subjects to make aesthetic judgments, as, for example, when we ask them which of two pictures or of two pieces of music they prefer. The assumption is generally made that the correctness of their aesthetic judgments is an indication of the reality of their aesthetic experiences. Obviously this need not be the case. It might be that the subject had a real aesthetic experience which was opposite in direction to that adopted as norm in our experiment. He might genuinely prefer the picture which most people would regard as the worse one. More serious is the fact that he might make the correct judgment without any aesthetic reaction, because, for example, he knew which was generally esteemed to be the better picture or because he knew some rule (e.g. some rule of composition) which was followed by the better picture and broken by the worse one.

3. Art Production and Appreciation as Social Phenomena

The production of works of art is socially conditioned. The artist is putting the product of his own mental activities into a visible or audible form so that his experience may be shared by other people. The number and the character of works of art is largely determined by social demand. If devotional pictures for the adornment of churches are required by the society in which he works, the artist produces religious pictures, if they are required for decoration of houses, he produces landscapes or figures. The derivative artist shows the greatest dependence on the generally accepted aesthetic standards of his time, producing works of art which call up the habitual perceptual and emotional reactions of the majority of the members of the society to which he belongs, but performing no social function of enlarging the range of these reactions.

The original or creative artist is nevertheless not free from the influence of his social environment. He also inherits the traditions of past workers in his own subject, and produces works of art in response to a demand from some or even the majority of the members of his society. He differs from the purely derivative artist in the fact that he is not content to satisfy this social demand by the production of familiar art forms but is only satisfied with producing something new, usually along familiar lines but sometimes along relatively unfamiliar lines.

His freedom of innovation is limited by the improbability of any of his potential audience reacting appropriately to excessive novelty in art and also generally by the limits of his own capacity for so reacting. It is very commonly further limited by his membership of a school whose general traditions and technical methods he shares. When an original artist is working along generally unfamiliar lines, those appreciating him in his own time may be limited to a small group and it is by this group that his production is socially conditioned.

The fact that a work of art appeals only to a small minority is not, of course, relevant to the question of its artistic merits. Keats's *Ode to a Nightingale* produces, for example, in most English people, the tendency to produce an interjection expressing admiration (the typical aesthetic reaction), but it is not any the less a supreme work of art. A much smaller number will react in the same way to *The Windhover* by G. M. Hopkins —

I caught this morning morning's minion, king-
dom of daylight's dauphin, dapple-dawn-drawn Falcon, in his riding
Of the rolling level underneath him steady air, and striding
High there, how he rung upon the rein of a wimpling wing
In his ecstasy ! then off, off forth on swing

For the majority of people the possibility of an aesthetic reaction is limited by a failure to understand the poem, not merely as a result of the obscurity of its literal meaning but much more by uncertainty as to its aesthetic aim and the unfamiliarity of its metrical structure. Yet a minority confidently affirm that this too is a supreme work of art worthy of a place beside the odes of Keats, and this judgment may also be made by a majority in fifty years time when the social conditionment of poetic appreciation has changed in its approved objects.

For aesthetic appreciation is no less socially conditioned than is artistic production. Gothic cathedrals which seemed beautiful to their builders and seem beautiful to us now, were considered at best as inferior, at worst as ugly, by the architects of the Renaissance. The pictures of the early impressionists were considered to have no artistic merit at all by the contemporaries of their painters, but afterwards, when they had become socially recognised, they were sold for large sums of money, and people experienced genuine aesthetic pleasure in looking at them. Now that people have grown accustomed to look for the qualities of design which have characterised the principal painters of more recent times, these early impressionist paintings tend to appear to them to be formless, and declining aesthetic appreciation of them is reflected in declining market valuation.

To say that aesthetic reactions are socially conditioned does not imply that the aesthetic reactions of an individual are merely a reflection of those prevalent in the society round him. His own experiences of paintings, music, and poetry, will modify the general pattern of appreciation which he has taken over from the people round him. He will react to some works of art that the general opinion regards as worthless and may fail to do so to others which general opinion approves. His divergence is likely in many respects to be not only from the majority opinion on the relative merits of different works of art but also from that of any minority which he is willing to recognise as more authoritative arbiters of taste than himself. He may like the poetry of Swinburne better than that of Wordsworth and have no justification for this preference except the psychological fact that the one calls out a response in him and the other does not. If his aesthetic judgments were based on no experience of his own but only on his knowledge of how other people judged, there would be no divergence. As Mr T. S. Eliot has said "Genuine taste is always imperfect taste" ⁷⁶

One of the ancient problems which arises in connection with standards for aesthetic judgment is that as to whether there is any absolute standard by which one work of art can be said to be better

than another, whether it is judged as better or worse by a particular individual, by a social group, or by a cultured minority within that group. The psychologist making a test of art appreciation is inclined to think that there is some sense in which one picture is better than another, although for determining which is better he must use some imperfect standard of comparison such as his own opinion, or that of the majority, or that of those who are regarded as sound arbiters of taste in the particular form of art he is investigating. In fact, it makes no difference to his practice whether he believes that there is an absolute standard of merit by which his own or group opinions might be judged, or that there is no such standard, or that the question of an absolute standard is a meaningless one. If there is an absolute standard of art value, it is of no use to him since he is a product of his own social conditioning and therefore cannot know it. He must use the standards which are available to him. He may use his own judgment, or a majority judgment, or the opinions of a selected minority, or any combination of these. It can make no difference to his actual practice if he supposes that one or a combination of these gives him an approximation to an absolute standard or whether he merely regards his experiment as measuring the responses of an individual against a socially determined standard which can lay no claim to absolute authority.

4. Psychological Experiments on Aesthetics

The first person to try by experimental methods to determine the quality in the object which led to aesthetic enjoyment was G. T. Fechner, who was also the founder of the psycho-physical methods of experimentation⁸³. He dealt with a very simple aesthetic problem of the proportions of the sides of a rectangle which gave the most pleasing shape. He found that for a majority of subjects the most satisfactory shape was one as close as possible to the "golden section" in which the ratio of the shorter side to the longer is the same as that of the longer to the sum of the two (that is, the ratio of width to height is about 19/31).

There have been many experiments on emotional reactions to single colours. By various methods (paired comparisons, etc.) the preferences of different people for different colours have been determined. This, however, is an experimental situation too simple for any real aesthetic problem to arise. It appears to be a fact that one person may say he likes red better than green, while another says he likes green better than red. This fact may have bearings on problems of personality differences, but it has no bearing on the problems of aesthetics. An artist may use both red

and green for different purposes, and a colour that an individual reports that he dislikes in the experimental situation may seem to him entirely appropriate when he sees it used for a particular artistic purpose

There is, however, a real aesthetic problem of a simple order in connection with the placing of colours in juxtaposition. This is a problem we have to solve when choosing a necktie to go with a suit no less than in painting a picture. Ostwald performed experiments which indicated that colours were pleasing in combination when they were simply related within the colour solid, *e.g.* two hues that were complementary and of the same saturation, or three hues of the same saturation that were equally spaced round the colour circle, or three colours of the same hue but of different saturation that were equally spaced along a diameter of the colour solid.²⁰⁶ Ostwald's experiments were carried out with some neglect of the precautions used in psychological laboratories and, as a result, his findings have been largely ignored by psychologists, instead of having been confirmed or refuted by better-designed experiments.

A more elaborate experiment from a psychological laboratory, dealing with the same problem, is one by von Allesch⁷ in which large numbers of hue combinations were presented in pairs without any clear tendency for any pairs to be preferred to others. Since, however, von Allesch used film colours and not surface colours, his experiment was somewhat remote from the actual conditions under which preferences are felt, in which it is the colours of objects that are felt to be pleasing or unpleasing in combination.

These are examples of experimental researches directed towards finding out what is the characteristic of the external object that gives it the property of giving aesthetic satisfaction to the beholder. Other investigations have been directed towards the problem of elucidating the nature of the aesthetic response.

A number of researches have been carried out on lines first laid down by Bullough^{39, 40}. He used as his material single colours and also pairs of colours. He asked his subjects to report whether they liked them or not, and to give their reasons for their likes or dislikes. He found that he had four types of reply. Some replies showed that their subjects were taking an intellectual and critical attitude towards the colours themselves. He called these the *objective type* of reply. Other replies spoke of the physiological effects of the colours, referring to them as stimulating, warming, etc. These were replies of the *physiological type*. Other subjects referred to associations with the colours, and liked or disliked colours as they suggested to them pleasant or unpleasant things.

or situations—the *association type*. Lastly, there were replies of what Bullough calls the *character type*. These were replies of subjects who read feelings and human characteristics into the colours—speaking of them as jovial, energetic, and so on.

Bullough's experiments were made with material of a very simple kind. It is very doubtful whether reactions to single colours are aesthetic reactions at all. The observations have been repeated, however, with more complex art material and the results have been, on the whole, to confirm Bullough's types. Valentine used pictures in one series of experiments,²⁹¹ and Myers used music reproduced by a gramophone.²⁹²

These investigators also found the same types of responses as those reported by Bullough. Although undoubtedly, to this situation, different people respond in different ways, I think it may reasonably be doubted whether this observation throws any light on the nature of the aesthetic response. The interjection expressive of wonder and admiration seems not to have been one of the classified responses, so it must remain doubtful whether the subjects were reacting aesthetically at all. Even if they were, the associations, etc. they reported may well have been irrelevant to that response. We should not expect to discover anything of importance about the psychology of humour by reading funny stories to our subjects and asking them what they were thinking about while we were doing so.

Individual differences in aesthetic taste have been measured by tests in which the subject has been asked to choose the better of two pictures or other works of art, of which one has been judged the better by some standard. The conformity of an individual's judgments to this standard are then taken as measures of his capacity to appreciate this form of art. Many tests of this type have now been devised. One of the earliest was the Meier-Seashore test of art appreciation in which a series of pairs of pictures was given for comparison, both pictures of any one pair being identical except in one respect.¹⁹⁰ Such tests are useful as a means of making an estimate of individual differences in art appreciation and for finding out how this is related to other measurable qualities of personality. They have obvious limitations. The material used has often little power of inducing an aesthetic reaction. However good may have been the original pictures, their reproductions in reduced size and without colour is likely to have little real aesthetic character. Moreover, what is directly measured is art judgment and not art appreciation. Judgment can only measure appreciation if it is based on appreciation and not on knowledge of the rules by which conventional judgments are made.

5. Individual Differences in Capacity to Respond to Works of Art

Further experimental problems arise in connection with the sensory and perceptual differences which may make differences in the capacity to respond to works of art, quite apart from those differences that result from previous training and experience. For example, a colour-blind person does not have the same preferences in colour combinations as the normally sighted person. It is clearly unlikely that his preferred combinations would be the same, since the colours he sees are different. There are other differences of a sensory or perceptual order which also make the same work of art phenomenally different for different individuals.

These differences are well known to exist in music, although their nature is often thought of very vaguely. Teachers of music say that certain children have "no ear", and find that they respond very little to musical training. The most common idea of this defect seems to be that it is insensitivity to differences of pitch (or "tone deafness"). Complete insensitivity to pitch differences would, of course, mean that the child was unable to understand human speech, and is not found to be the cause of difficulty in musical training. Seashore has devised a number of tests for the measurement of the sensory capacities needed for musical appreciation and performance²⁴⁴. He found that capacity for pitch discrimination shows wide individual differences and that, although a low sensitivity to pitch differences is a handicap in some kinds of musical performance, it is not a very important factor.

Perhaps more important than sensory differences are perceptual differences, on which comparatively little research has been done. All works of art have a form or pattern imposed on their content. Response to this form is a perceptual activity which may take place in a different degree in different individuals so that to some the work of art may not truly be perceptually present at all. A succession of notes, for example, has a form resulting from pitch and time relations—melody and rhythm. The perception of a melody depends not merely on distinction between the pitches of successive notes but also on the perception of these as a unitary configuration. The complexity of pitch successions which form such unitary melodic configurations certainly differs in different individuals (even apart from the effects of training) so one man may find a piece of music chaotic and tuneless whose melodic form is clear to another.

Similarly a whole work of music has its own configurational properties, it forms a greater pattern of which the lesser patterns of its melodies are constituent elements. This larger pattern may not be perceived at all by a hearer to whom the whole work is

simply an aggregation of melodies. He may take great pleasure in the hearing, but will necessarily miss much of the essential purpose of the composer. We may thus understand the popularity of the hotch-potch of unrelated melodies from various sources which form a considerable part of popular music.

Similar perceptual factors are found in other arts. A picture is formed of parts in relationship to each other. This relationship, in which may lie the aesthetic quality of the picture, cannot be appreciated if the observer does not see the parts in the same way as the artist intended. Thus a picture by Cézanne may appear to an observer to be a mere muddle until his perception becomes articulated into the interrelated parts intended by the painter. Some pictures are intended to be seen as flat surfaces, others as three-dimensional. For example, the design of Braque's pictures depends on their three-dimensional character. If they are seen as flat, their total design does not appear. A common opinion that they lack qualities of design is probably put forward by those who see them flat. I have found, myself, that these pictures tend to appear flat to binocular vision, but that I can see them as three-dimensional if I look at them with one eye through a tube. Many other people (including probably the artist himself) see them as three-dimensional without any special device. To these the aesthetic purpose of the artist is apparent without difficulty. Most pictures may be seen either as masses or as outlines. If the design of the artist is a relationship between the outlines, this design may be wholly lost to one who perceives the picture as a system of masses.

Experiment shows also a wide individual difference in the extent to which different individuals perceive the mathematical relationships of perspective.²⁷⁸ This does not affect the ability to perceive design but may much affect the representational character of a painting. It has become traditional in Western art to reproduce the convergence of parallel lines, the diminishing sizes of distant objects, etc., in full as they would appear in an image cast by a lens, in spite of the fact that these effects only appear partially (and for many people very little) in the perception of an actual scene. For those whose tendency to see things in their "real" shapes and sizes is small, traditional perspective is a close enough approximation to what they see, and art in which it is not generally used (such as that of the Chinese, the Indians, and some modern Western painters) seems to them to be non-representational, while those with a large tendency to see the "real" characters of objects find no such difficulty. There is indeed reason to suppose that differences in traditions as to the representation of perspective may be due to racial differences in perception. A group of Indians, for

example, showed a greater tendency to see the "real" characters of objects than did Europeans²⁷⁹

It is therefore clear that, apart from differences in taste, there are sensory and perceptual differences which may determine aesthetic reactions. We cannot be certain that two persons making different judgments of the quality of a piece of music or a painting are differing in taste about the same object. Their perceptual differences may be such that, as phenomenal objects, the works of art they are reacting to are very different and have very different artistic qualities.

6. Psychological Conditions of Art Production

The production of a work of art—a poem, picture, statue, or musical composition—may be regarded as the putting into concrete form what was in its psychological origins a mental phantasy. A mental phantasy serves a useful purpose in the psychological life of the individual, compensating him for his frustrations and giving an internal solution of other mental conflicts. In addition to the question of what conditions a work of art must fulfil for it to be valuable as art, we can ask why an art product (whether good or bad) has come into being at all.

It is true that much production of works of art needs no further psychological explanation than the money they bring their producer. An economic demand for art products causes the production of much derivative art by those who have learned a technique as a means of earning a living, and, lacking any strong impulse to artistic creation, satisfy popular demand by imitating those works of art which are popularly applauded. It is not with the production of such derivative works of art that we are concerned but with those that are the product of a genuine creative impulse.

The most superficial investigation of the lives of many artists reveals peculiarly severe mental conflicts, due partly to the strength or to the unusual objects of their cravings, partly to unfortunate elements in their external conditions. These conflicts are so common that it is difficult to avoid the conclusion that they are causally connected with artistic production. We may notice, for example, the homosexuality of Michelangelo, the Don Juanism of Lord Byron, and the Platonic Don Juanism of Shelley. All three of these producers of works of art had peculiarities in their emotional constitution which made their normal satisfaction impossible without social disapproval, and therefore produced a condition of conflict. Even earlier than these peculiarities, we find abnormalities in the conditions of their childhood. Byron was on bad terms with his mother, while Shelley was persecuted by his schoolfellows at

Eton and carried over into his later life, with obvious results on the content of his poems, a hostility to human conventions and to the God whom he thought of as sanctioning them

While peculiarly severe conflicts are so common amongst the producers of works of art as to make it certain that the connection between conflict of unusual severity and art production is not accidental, this relationship is not universal. Wordsworth had a life as free from conflict as most people, but was a prolific producer.^{*} The deprivations of ordinary life may be sufficient to produce compensation in phantasy amongst people with no particular external or internal cause of mental disturbance.

The production of a work of art or other phantasy product seems to serve the purpose of allaying the condition of anxiety which is its motive force. Art production may itself be regarded as a process of mental healing. The artist is exteriorising his conflicts and allaying the anxiety arising from them. Obviously not completely, or this motive force behind his production would disappear, whereas we know it to be generally persistent.

Under the influence of psychoanalytic thought, enquiry has been made into what is revealed by works of art of the mental problems of their producers. Dr E. Jones has, for example, found in Hamlet the working out of the hostility to his father which was an element of his Oedipus complex.¹¹ Such speculations have often been criticised because they are supposed to be attempts to answer a question other than the one with which they are concerned. This speculation is not an answer to the question as to why Hamlet is a great work of art but only to the question of why Shakespeare, in creating a work of art, chose this particular topic. In the same way, the spectator's unresolved Oedipus complex may explain why he is interested in the story, but not why he hails Shakespeare's play as a great work of art. If he were told the story in another form constructed by a less skilful hand, he might still be interested in the story without finding in it any aesthetic appeal.

What gives the works of the great artists their power of arousing the aesthetic response is not the fact that they are products of conflicts. It is that these workers have mastered the technique of their own particular art, and that they have an innate capacity which we cannot fully analyse but which is ordinarily called "talent". Without talent and technical skill the products of Michelangelo, Shelley, and Shakespeare, would have been aesthetically as worthless as are most of the productions of psychoneurotics.

* The one irregularity in his otherwise thoroughly socially ordered life seems to have been productive of no conflicts comparable with those of Shelley, Wagner, or Byron.

7. Education in Art Appreciation

One of the tasks of the teacher may be to extend the range of aesthetic appreciation of his pupils, in poetry, painting, music or any other art. He cannot do so by explaining a system of rules which will enable his pupils to distinguish good art from bad. There are probably no rules which can cover the essential uniqueness of an original work of art. If there were, the learning of them might create art critics but not art appreciators. No one who had the task of teaching humour to a class would think he had achieved his object if, on hearing a joke, they correctly but unsmilingly stated whether it was a good joke or a bad joke by seeing whether or not it conformed to the rules of humour. There is no better reason for supposing that a parallel method will bring a class nearer to appreciating poetry or painting.

There is, of course, a natural tendency of intellectual curiosity, after having laughed at a joke, to enquire why it was amusing. It is no less natural, after having been struck with wonder and admiration by a poem, to ask why it seemed so wonderful. The finding of an answer to such questions not only satisfies curiosity but may also help further appreciation, so it forms a proper part of art teaching so long as it is regarded as an activity subsequent to appreciation and not as a road to it.

Equally, one cannot hope to produce aesthetic appreciation by giving information about metres, or about the subject matter of the poem. These too play a part in aesthetic education, since the barrier to appreciation may be an obscurity which can be removed by explanation. One cannot, however, travel along a road merely by removing barriers.

If we wanted to educate a class in humour, we should have to tell them jokes, chuckling with amusement while we told them. Not in the hope that by suggestion we shall induce the same response, but in the hope that in time they would get the idea of humour. When we saw some of their faces break into a smile, we should know they were beginning to get the idea. Their appreciation of humour would be limited at first, and we should hope that the range of what amuses them would in the end become wider. But we should know that they were on the right road, and they would never have been there if we had merely explained the rules.

The teaching of aesthetic appreciation requires a similar method. The teacher who has a real appreciation of poetry himself will read it in such a way that his own reaction to it appears in his voice. One by one his pupils may experience for themselves the glory that he himself experiences. Their taste will be limited and imperfect to begin with, but it will be real sensibility, they will be in process of becoming genuine appreciators and not mere critics.

CHAPTER XXV

THE PSYCHOLOGY OF RELIGION

1. Religion as a Mode of Adaptation

The thing in life contrasting most sharply with the religious attitude is the attitude of living unreflectively in the present, being happy over present pleasures, screaming at present pain, frightened at present dangers, and neither brooding over death or misfortune in the remote future nor feeling need for hope of future happiness, or for a theory of the world process as a whole. This is presumably the way in which all animals lower than man live, it is the only way possible before the powers of imagery and reflective thought are developed. In this condition neither religion nor anything corresponding to it is necessary or possible.

In sharp contrast with the above attitude are those more or less deliberate adjustments by thought and by feeling to the world as a whole, of which *religion* is typical. The attitude of living merely in the present is one which becomes inadequate as increasing self-consciousness and power of reflection make thoughts of the future, and of other parts of the world process than that immediately present, become sufficiently real and charged with sufficient power over our happiness for it to be necessary to adopt some attitude towards them.

The legend of the beginning of the reflective life of Gautama Buddha is the story of the passage of man from the attitude of living in the present to the realisation of the necessity for adopting some attitude towards the world as a whole. It will be remembered that Gautama is supposed to have spent the early part of his life living happily in a palace protected from contact with all external things which could have forced on his attention the reflective attitude. Then, when outside one day, he met with a miserable beggar, an old man, a corpse, and a holy hermit, and he realised that, however protected his present life might be, the end of it would be misery, old age, and death. Misery, old age, and death had become, through this contact, realities to him such that he could be satisfied with no attitude towards life which did not take them into account. So he left his palace, and his later history is the story of how he made his adjustment.

Probably we see a pathetic record of the first dawning of this realisation in the mind of primitive man in the ochre-covered bodies

of his buried corpses. Once they are realised, these emotionally disturbing elements in life (which make a simple adjustment to the present impossible) are met by adopting some attitude towards the world and towards the process of life as a whole. The adjustment in thought may be by phantastic legends of the cosmic process, or by metaphysical or ethical theories. On the emotional side it may be joyful acquiescence, angry rebellion, or indifferent acceptance. On the practical or behaviour side it is some such course of behaviour as a systematised religious cult or action in accordance with some moral theory.

Every mode of adjustment has these three aspects of *thought*, *emotional attitude*, and *practice*, which are interdependent. Primitive Buddhism, for example, had on its thought side a belief in the universality and rigidity of the law of cause and effect, and the impermanence of all things, on its emotional side it developed contentment and serenity of mind, and, on its practical side, taught the destruction of desire, the attainment of enlightenment by meditation, and the systematic following of general kindness and right conduct. Mrs Rhys Davids has pointed out that this attitude resembles in many respects the world view suggested by modern science.²²⁹ For example, Bertrand Russell's *A Free Man's Worship* expresses a modern view not unlike that of Hinayana Buddhism.²³⁰

Religion is one such attitude towards the universe as a whole. Some would say that religion is any attitude towards the universe as a whole, but this is to define religion so broadly as to destroy the value of the word. Religion is one kind of adjustment, one which has, as an essential element, a world of forces or beings which is not the natural world around us and which we may call a "spiritual world". If an individual believes in such a spiritual world and adapts part of his behaviour at least to its requirements, he is adopting a religious attitude.

There is, of course, no one right way of using the word "religion", and the definition we adopt for it must be decided by the practical convenience of using the word in a way which is as close as possible to its generally accepted use. Definitions which restrict the use of the word "religion" to an attitude towards a God or gods have been criticised on various grounds. That it would exclude primitive Buddhism from what the word is taken to cover would be a disadvantage, although one could use the word in this sense and say that the Buddha's was a non-religious system of practical psychology.

More serious is the consideration (argued with especial force by J. D. Unwin²³⁰) that the supernatural beings of primitive religions

may often be artefacts of the investigator, due to his tendency to give definiteness to primitive conceptions which are really vague and to express them in the definite and personal terms which belong to the thought of the investigator. It is possible, therefore, that when, in descriptions of primitive religions, we find such a term as "spirit" or "god", the meaning would be better expressed by a vague and impersonal term such as "power". We should be doubtful whether such systems of thought should be included in the term "religion" if this were defined in a way which implied belief in a God or gods, whereas they are clearly covered by the wider definition which makes the distinguishing mark of religion an adjustment towards a spiritual world.

When we speak of religion as one of the ways in which man adapts himself to the universe as a whole, it must not be forgotten that this adjustment is not, in fact, carried out by a solitary individual. It is made under the influence of his fellow men, and the religious individual takes over in great measure his beliefs, his ritual behaviour, and his religious ways of feeling from an organised group of other people. In other words, religion is in great part a social phenomenon—its beliefs are social beliefs and its rites consist in individuals taking part in social ceremonies. This is the side of religion which is specially stressed by the school of French sociologists of whom the best-known exponent is *Levy-Bruhl*^{16a}.

This is not, however, the whole truth about religion. One of the most striking features of the development of religion is its passage from the purely social form of adjustment to an adjustment of the individual. The most individual form of religion is, nevertheless, still an adjustment that takes place in a social environment, and this environment cannot be neglected in dealing with the individual's religion, but it becomes progressively less important. In the most developed religions the emphasis is shifted from the relationship of a social group to its God, to the relationship of an individual to his God. We cannot, therefore, be content with the French sociologists to describe religion as merely "*un fait social*"

2. General Problems of the Psychology of Religion

The psychological problems of religion are two—one belonging to general psychology, the other to individual psychology. The problem of general psychology is to investigate the mental origins of the religious mode of adjustment as it is found in the average religious person, and the problem in individual psychology is the question of the origin in innate constitution and environmental circumstances of the individual differences in the religious adjustment—why, even under the same social influences, one person is

strongly religious and another irreligious, and why one finds his spiritual home in one form of religion while another finds it in another form of religion

Leuba has pointed out the insufficiency of any definition of religion which describes it as merely a system of intellectual opinions, or as merely a system of ways of feeling, or as merely a system of ways of behaviour¹⁶¹. It is all three of these things together

Every religion has a systematised body of beliefs (its *dogma*), a system of emotional reactions to the objects of these beliefs, and its system of ways of behaviour (the *religious rite*). All three of these are organically connected together. Religious dogma is not merely a set of intellectual propositions. It is also a statement of the possibility of religious ways of feeling and of the effectiveness of religious modes of behaviour, and it cannot be understood properly unless considered in conjunction with these ways of feeling and behaving. What we have to give an account of in our psychology of religion is, therefore, religious dogma, religious feeling, and religious rites. No one of these can be treated adequately apart from the others. We have already seen that, in the individual's religion, his beliefs and rites are largely taken over (by the process of group suggestion) from his social environment. If all of his religious attitude were taken over in this way without any reaction on it of his own personality, we should be justified in saying that religion is merely a social product.

This, however, is not the full story of the development of the religious sentiment in the individual. The body of beliefs he takes over from his social environment will be acted on by his own intellectual processes; he will reason about them and criticise them, and will be unable finally to find a satisfactory adjustment for his own problems in a system of beliefs which he cannot justify intellectually*. And, moreover, the individual's own emotional experiences make an individual contribution to his religious beliefs. The emotional experiences which have a bearing on religion are, for example, those of conversion, the sense of penitence and forgiveness, and of the felt presence of God in prayer and sacrament. These unquestionably play a large part in the building up of most persons' religious sentiments.

In fact, we may say that, at adolescence, the body of religious beliefs, feelings, and behaviour, which have been socially received

* It is true, of course, that his intellectual criticisms will often be *rationalisations* of his emotional needs, but I see no reason to doubt that there is such a thing as intellectual criticism apart from rationalisation, and that this criticism is operative in any intelligent person's acceptance or rejection of a body of opinion supplied to him by his social environment.

in childhood, are subjected to the impact of the individual's own intellectual criticisms and his own emotional needs, and this system is accepted and modified or totally rejected according to how far it satisfies the requirements of these influences. The religious adjustment, therefore, is made up not only of a traditional element but also of what we may call an *experiential* element, and a *rational* element.

It has sometimes been maintained that men have a specific religious instinct. Even though we may agree that distinctively human kinds of behaviour and thought may be based on innate drives, it is plainly very improbable that there should be a specific innate drive towards behaviour which man shares with no animal. A more reasonable explanation of religion in terms of human instincts (or propensities) would be that the energy of primitive drives with various biological ends may be *deflected* into the religious channel. That not one but many different drives may contribute energy to religious life and behaviour is suggested by the fact that the ascetic practices of those training themselves to lead the most intense religious life included suppression of the primitive modes of expression of a variety of behaviour tendencies. The sex tendency was suppressed in chastity, the assertive tendency in meekness, and the primitive comradeship tendency in voluntarily accepted solitude.

That religious behaviour is by no means independent of the sex drive is shown by many observations. The commonness of phallic and other sexual symbols in many primitive rites is often adduced as evidence by those who claim that religion is solely based on sexuality, but it is probable that they are not relevant since these symbols are probably connected with the practical aim of securing magical control of animal fertility in pastoral communities, although they sometimes also have uses in connection with human fertility. More important is Starbuck's observation of the connection in time between puberty and conversion⁵⁹. Many of the phenomena of mysticism seem also to be sexually conditioned, and to be necessarily preceded by sexual deprivation. A temperate and reasonable account of the relationship between religion and sex is to be found in the work of Flourney⁶⁰.

Freud has suggested that the driving force behind both totemism⁶¹ and the more developed forms of religion comes from the infantile relation of dependence on the parents, and that the function of religion is to give man a feeling of security in the face of a Nature hostile to him and to act as the buttress of a cultural system to whose demands man unwillingly submits⁶². Bovet has also put forward a theory of the development of religion from a

child's relationship to his parents, although he does not attribute religion to a single origin³¹ He has also described the deflection of the tendency to pugnacity into religious channels (of which he finds examples in the Salvation Army and in the foundation of the Society of Jesus)³⁰

3. Individual Psychology of Religion

Psychologists have given more attention to the general problem of the nature of the psychological forces behind the religious attitude than they have to the problem of the reasons in individual mental history which produce differences in religious adjustment amongst people from the same social environment This problem has been studied much more fully in the more abnormal religious developments of the mystics than it has in the development of ordinary religious persons For this study there is much valuable material in the recorded lives of the mystics and in such careful studies of individual mystics as those of Baron F von Hugel²⁶ and Delacroix⁶⁶ It is clear that the initial impetus towards the mystical life may often be provided by a peculiarly severe deprivation such as the failure to find happiness in love A certain amount of mental instability is probably also a determining factor, the general nature of the mentality of a person who becomes a mystic is certainly related to that of a person who becomes a psycho-neurotic

On the more important question of what constitutes individual religious differences amongst normal persons, no work of comparable completeness has been done The most hopeful suggestion comes from the psychoanalysts' suggestion that the child's attitude towards his parents is the framework on which is later modelled his attitude towards God The father, for example, who drives his son to rebellion by over-great severity, may lay the foundation for an adult attitude of rebellion against God and against the world process as a whole, while the child who is cowed into submission by similar parental severity will find the most satisfactory conception of God one in which He is regarded as a severe lawgiver

There has, however, been much more speculation along these lines than precise study No attempt has, so far as I know, yet been made to obtain statistical information on which to base a correlation between childhood attitude to the parent and adult attitude to God Until such statistical information is obtained, such theories remain unproved speculation

4. Religion and other Modes of Adaptation

It is a view commonly put forward that the mode of adjustment to the world must develop from the old adjustment based on a

belief in a supernatural system to one of ethical principles with no supernatural background. The moral principles of religion are regarded as essential to a harmonious existence in the world, and these moral principles have only been accepted in the past in their religious setting. Now we are supposed to have advanced to a stage in which this setting is no longer necessary or possible. We must abandon the religious sanction of morality (understanding supernaturalism as merely a symbol adapted to a primitive stage of thought) while clinging to the system of morality which it enshrined.

It is of course necessary to agree that no honest man can wish to maintain a false system of beliefs merely because it is socially convenient, whether the convenience is to support morality or to promote mental health by giving believers a motive for accepting frustration. If the religious system of beliefs is false, then it must be discarded and man must adapt himself to the world in some other way. Those who argue in favour of a rational this-world system of adjustment seem, however, to accept too easily the proposition that belief in a spiritual world is necessarily false. Neither the consideration that some belief in a spiritual system is found amongst primitive people nor the consideration that such a belief serves moral and psychological ends are themselves sufficient grounds for supposing that the religious system of beliefs is false. It may be that man is a spiritual being, living to serve spiritual ends, and that life in this world is an incident on a road to a spiritual destiny. The choice between this system of beliefs and its opposite must, however, be made on rational grounds. We should not invite people to accept a spiritual interpretation of the universe merely such a belief will make them more moral, happier, or better adjusted, it is to be accepted only if we believe it to be true.

There have been in the past many attempts to furnish non-supernatural world adaptations which have outwardly borne a more or less close relationship to the old religious practices which they were supposed to supersede. The worship of Reason during the French Revolution, the Positivism of Comte, and the modern ethical Churches, are all examples of such substitutes for religion. Probably the most remarkable of these, historically, was the system of Gautama Buddha. In the Sutta on the Three Vedas he scoffs at those who make central in their religion the attempt to ascend to Brahma in ecstasy³¹³. The later exaltation of this essentially anti-theistic teacher to a position in the Godhead worshipped by the greater number of the millions of modern Buddhists is an illustration of the incurable preference of most men for the religious adjustment.

Religious institutions have, no doubt, in the past, been the principal social unifying forces. There is probably a still earlier stage to be found amongst primitive people (such as the Melanesians) where religious ways of behaving are not so much themselves separate social integrating forces as inseparably bound up with all other customary modes of behaviour which unify the group. In either case, deviations from socially accepted religious beliefs and modes of behaviour are socially disruptive forces and heresy has therefore, in the past, been punished with death.

At the present time there is a common opinion that religious orthodoxy and membership of religious groups is declining in civilised communities. There is also empirical evidence that this is the case.²⁸⁰ It is true that new religious groupings have appeared and have won large numbers of adherents. Some of these are only loosely connected with Christianity (such as Christian Science, Spiritualism, Theosophy, and Anthroposophy). Recent movements more closely following the main Christian tradition are the Oxford Group movement of Dr Buchman, and various "fundamentalist" movements. While these movements have won adherents in considerable numbers, their success is not so great as to counteract the general tendency of religious institutions to decline.

The truth seems to be that religious institutions, for various reasons, have ceased to be important social integrating forces. Similarly, religious differences are ceasing to be important segregating forces. It naturally follows from this that religious deviations cease to be socially disruptive and therefore are now tolerated. We have, however, no reason for flattering ourselves that the decline of religious intolerance is a sign of a greater tolerance amongst ourselves of deviations in belief and principles of conduct. As religious differences become less important, political differences become more so, and the mutual persecution of fascists and non-fascists and of communists and non-communists have shown the same psychological tendencies at work as did the religious persecutions of the past.

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